DATA REPORT

Characterization of Shore Terminal Sediments: Results of Dredge Materials Sampling and Analysis

Site LRT-S02

Prepared for

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April 2006

PACIFIC ECORISK
ENVIRONMENTAL CONSULTING & TESTING

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ASTM	American Society for Testing and Materials
Bay	San Francisco Bay
BCDC	Bay Conservation and Development Commission
CAS	Columbia Analytical Services, Inc.
COC	Chain-of-custody
CV	Coefficient of Variation
DGPS	Differential Global Positioning System
DMMO	Dredged Material Management Office
GPS	Global Positioning System
ITM	Inland Testing Manual (USEPA/USACE 1998)
JBA	John Brezina and Associates
LRTC	Levin-Richmond Terminal Corporation
LTMS	Long Term Management Strategy
MLLW	Mean lower low water
PER	Pacific EcoRisk
QA/QC	Quality assurance/quality Lab Control
RSD	Relative Standard Deviation
RWQCB	Regional Water Quality Lab Control Board
SAP	Sampling and analysis plan
SLC	State Lands Commission
SOP	Standard operating procedures
TEG	TEG Oceanographic Services
TOC	Total Organic Carbon
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency

1. INTRODUCTION

The Levin-Richmond Terminal Corporation (LRTC), located in the Richmond Inner Harbor Channel in Point Richmond, CA, (Figures 1-1 and 1-2), is currently seeking a 10-year permit from the U.S. Army Corps of Engineers (USACE), and 5-year permits from the Bay Conservation and Development Commission (BCDC) and San Francisco Bay Regional Water Quality Lab Control Board (RWQCB) for maintenance dredging of their berth areas.

To accommodate vessel transit and berthing and appropriately maintain essential Terminal operations, LRTC requires dredging of the Site S02 berth area to a depth of –38.0 ft MLLW + 2.0 ft over-dredge. The proposed maintenance depth and estimated volumes of dredged material, including over-depth, are summarized in Table 1-1.

Table 1-1. Proposed maintenance dredging for the Levin-Richmond Terminal Corporation

Site	Permitted Depth (ft MLLW)	Estimated Volume (yds^3)	Over-depth (ft)	Estimated Volume (yds^3)	Dredge Depth (ft MLLW)	Total Estimated Volume (yds^3)
LRT-S02	-38.0	11,922	+2	5,120	-40	17,042

With DMMO approval of the previously-submitted Sampling and Analysis Plan (SAP), the Site S02 berth area was sampled to a total depth of –40.0 ft MLLW, and full Inland Testing Manual (ITM) testing was performed in order to satisfy permit requirements. Sample locations are presented in Figure 1-3.

1.1 Objectives of the Sediment Investigation

The purpose of this investigation was to evaluate the proposed dredged material to determine whether it will represent an impact during removal operations and placement at the SF-11 Disposal Site. The procedures for sediment sample collection, sample processing and preparation, physical and chemical analyses, biological testing and data analyses were presented in a previously submitted-and-approved SAP (PER 2005). The specific objectives of sampling and testing program were as follows:

- Collect core samples from within the designated sampling areas following field protocol detailed in the SAP;

- Conduct chemical and biological analyses to determine whether sediments are suitable for unconfined aquatic disposal (SUAD), with bioaccumulation testing being deferred pending analysis of the dredged material chemistry data.

1.2 Organization of this Document

Sample collection and handling procedures are discussed in Sections 2 and 3. Chemical analyses and bioassay results are provided in Section 4. Section 5 presents the conclusions regarding suitability of the material for unconfined, aquatic disposal at SF-11, and references are provided in Section 6. Appendices A-K contain supporting documentation for this study.

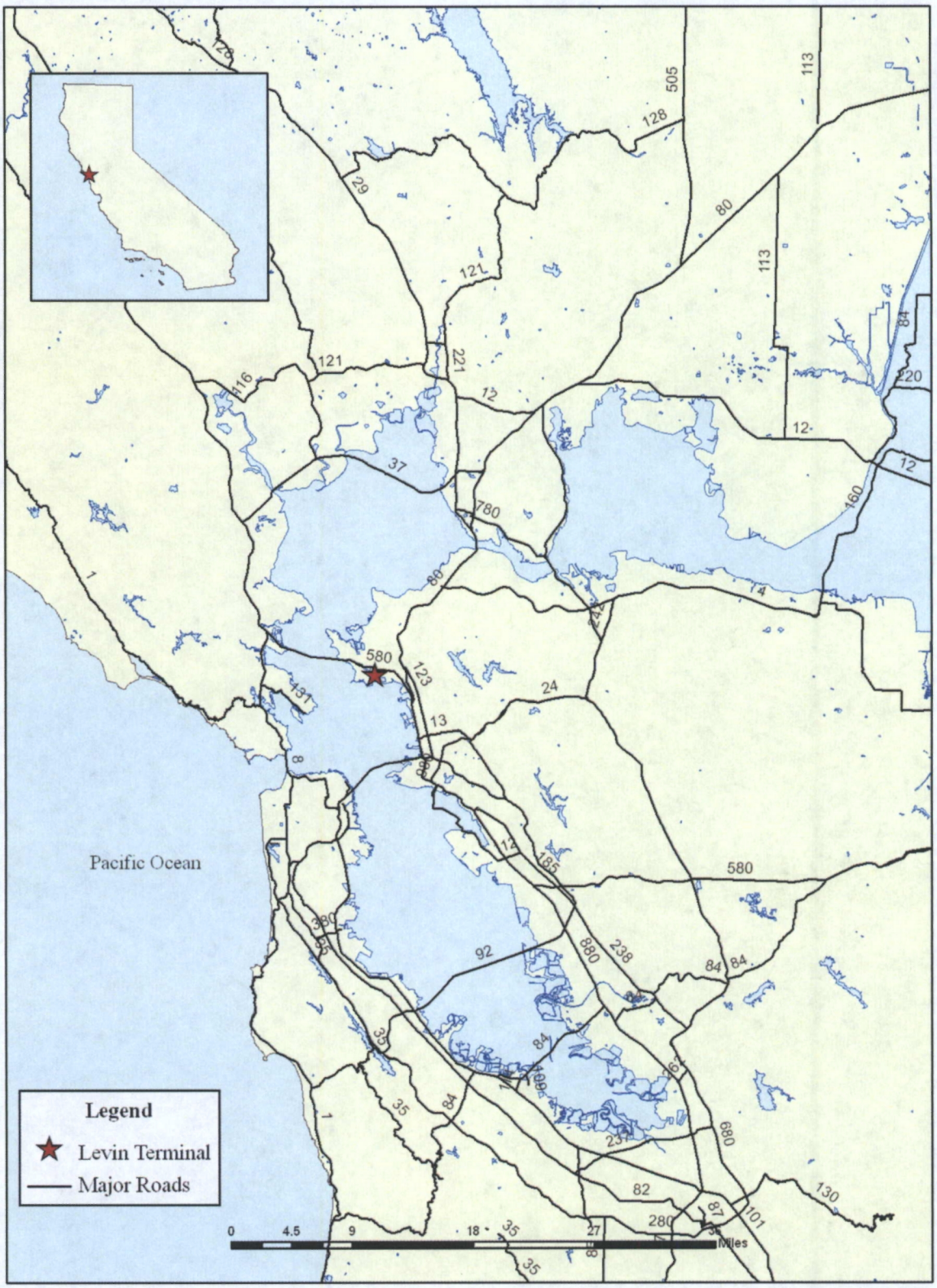

Figure 1-1. Location Map: Levin-Richmond Terminal

Figure 1-2. Vicinity Map: Levin-Richmond Terminal

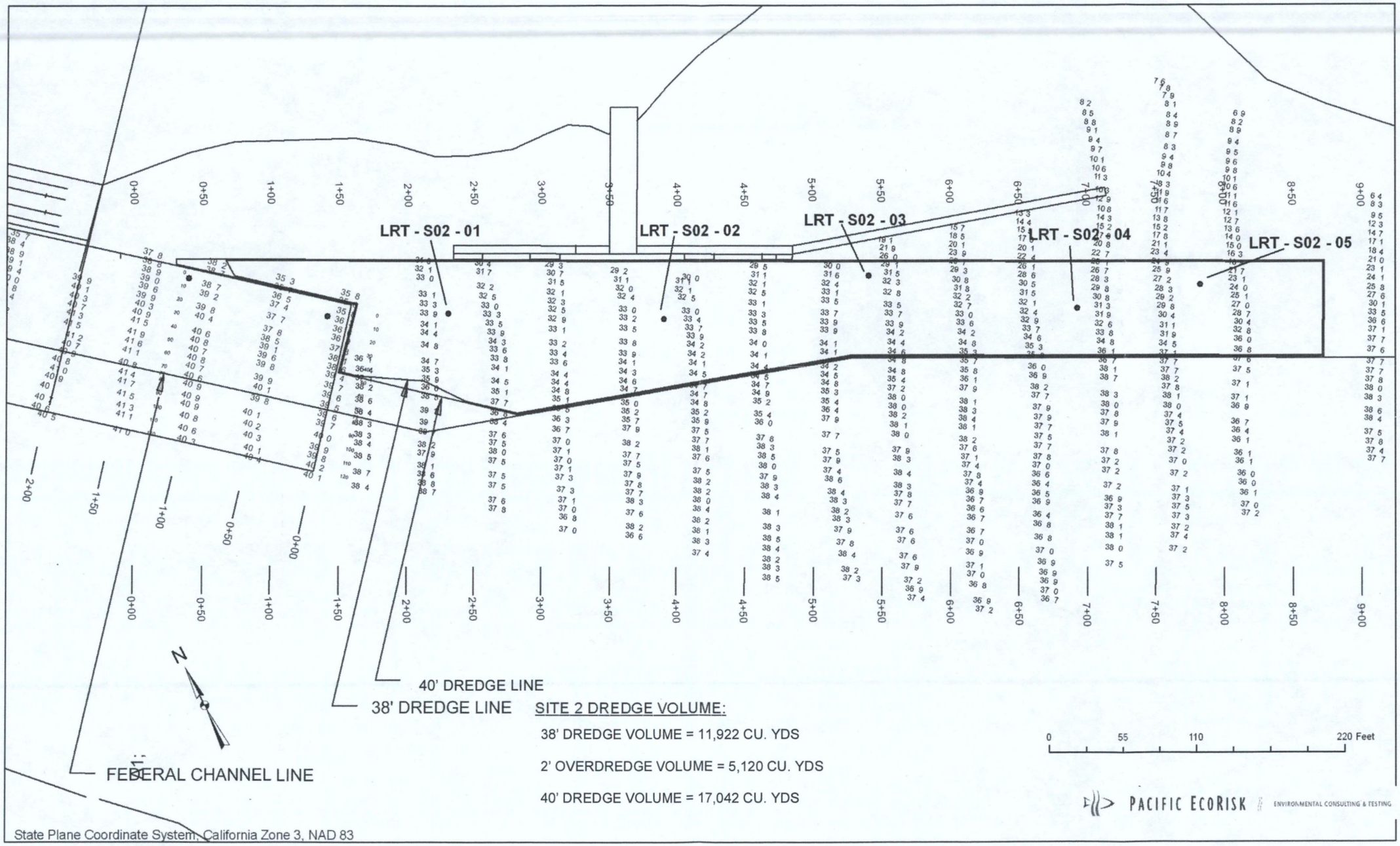

Figure 1-3. Site LRT-S02 (Shore Terminal) Sediment Core Locations

2. FIELD SEDIMENT SAMPLE COLLECTION

All sediments were collected in accordance with guidelines and procedures outlined in the SAP (PER 2005). All sediment sampling field activities were performed on October 17, 2005, under the direction of Mr. Jeffrey Cotsifas (PER). Mr. Mark Mertz of TEG Oceanographic Services (TEG) provided the sampling vessel, on-board positioning system, and vibratory core. PER also provided an additional Field Scientist to assist in sediment core collection. Five sediment cores were collected Site 2 (Figure 1-2). Final site positions were determined with a differential global positioning system (GPS) and are accurate to ± 3 m. Table 2-1 lists station identifiers, GPS coordinates for all core locations, mudline elevations, and core penetration depths for all stations; sample locations are presented in Figure 1-3. Each site sediment core was collected into a cleaned polycarbonate tube liner within a 4-inch diameter steel core barrel, using a vibratory core system.

Table 2-1. Locations of sampling stations, core penetration depth, and core retrieval length.

Sample ID	Latitude (N)	Longitude (W)	Mudline Elevation (ft MLLW)	Penetration Depth (ft)	Core Length (ft)	Cored Depth (ft MLLW)
LRT-S02-01	37°55.089	122°21.882	33.7	6.3	6.3	40.0
LRT-S02-02	37°55.079	122°21.845	33.6	6.4	6.4	40.0
LRT-S02-03	37°55.070	122°21.831	33.5	6.5	6.5	40.0
LRT-S02-04	37°55.066	122°21.809	32.4	7.6	7.6	40.0
LRT-S02-05	37°55.059	122°21.790	29.0	11.0	10.8	39.8

John Brezina and Associates (JBA) collected sediment from the San Pablo (SF-10) Disposal Site and the Alcatraz (SF-11) Disposal Site for use as reference sediments.

All sediment samples were maintained on ice until transported to the PER testing lab for processing. Upon receipt at PER, all samples were logged in and placed in cold storage at 4°C in the dark until needed. Field log sheets are presented in Appendix A. There were no unusual circumstances encountered during the fieldwork, and no major deviations from the SAP (PER 2005).

3. SAMPLE PROCESSING

The sediment material from each core section was each individually homogenized within a high-density polyethylene bucket to comprise the homogenized core sediments; a sub-sample of each homogenized core sediment was frozen for archival storage.

Proportionate volumes of each of the homogenized core "S02" sediments were composited and homogenized within a high-density polyethylene bucket to comprise the "LRT-S02" composite sediment. Sub-samples of the homogenized composite sediment sample (sample ID = LRT-SO2 COMP) were submitted for full chemical and conventional analyses and biological testing; additional sub-samples of the homogenized composite sediments were frozen for archival storage.

All sediment was processed following procedures outlined in the SAP (PER 2005), with no deviations.

4. LABORATORY ANALYSES RESULTS

4.1 Results of Conventional and Chemical Analyses

Sediment samples were analyzed for the chemical and conventional parameters specified in the SAP (PER 2005). Conventional parameters included total organic carbon (TOC), total solids, and grain size. Chemical analyses of trace metals, polycyclic aromatic hydrocarbons (PAHs), chlorinated pesticides, polychlorinated biphenyls (PCBs), and butyltins were also performed. The results of these analyses are summarized in Tables 4-1 through 4-7. The full Data Report for the conventional and chemical analyses that was submitted by the contracting analytical laboratory is provided in Appendix B.

4.1.1 LRT-SO2 COMP Composite Analytical Chemistry Results

The "LRT-SO2 COMP" site sediment was ~45% total solids, and TOC levels were moderate (1.14%). Grain size analyses indicated that the sediment was 88.1% fines (silts and clays), 13.25% sand, and ~0.0% gravel.

All of the metal analytes were generally similar to ambient bay concentrations (SFRWQCB, 2000). Total PAHs were reported at 110.4 μg/kg. With the exception of dieldrin, endosulfan II, endrin ketone, heptachlor epoxide, and Total DDT (measured at 3.4, 3.1,1.4, 1.2, 138 μg/kg, respectively), all organochlorine pesticides were below their respective detection limits. Total organotins were measured at 29 μg/L. All PCB Aroclors were below their respective method reporting limits.

Table 4-1. Results of grain size analyses of Levin Richmond sediments

Analytes	LRT-SO2 COMP	Method Reporting Limit
% Gravel	0.00	0.1
% Sand	13.3	0.1
% Silt	38.5	0.1
% Clay	49.6	0.1

Table 4-2. Results of conventional analyses of Levin Richmond sediments

Analytes	LRT-SO2 COMP	Method Reporting Limit
Total Solids (% as Dry Wt.)	44.7	0.1
Total Organic Carbon (%)	1.14	0.1

Table 4-3. Metals concentrations (mg/kg, dry wt.) of Levin Richmond sediments

Metals	LRT-SO2 COMP	Method Reporting Limit
Arsenic	7.0	0.5
Cadmium	0.40	0.05
Chromium	83.0	1.0
Copper	39.3	0.1
Lead	30.1	0.05
Mercury	0.35	0.02
Nickel	59.7	0.2
Selenium	0.2	0.1
Silver	0.38	0.02
Zinc	82.8	0.5

Table 4-4. PAH concentrations (μg/kg, dry wt) of Levin Richmond sediments

PAHs	LRT-SO2 COMP	Method Reporting Limit
Acenaphthene	<1	5.6-5.7
Acenaphthylene	<1	5.6-5.7
Anthracene	<1	5.6-5.7
Benzo(a)anthracene	8.1	5.6-5.7
Benzo(a)pyrene	11	5.6-5.7
Benzo(b)fluoranthene	12	5.6-5.7
Benzo(g,h,i)perylene	12	5.6-5.7
Benzo(k)fluoranthene	9.3	5.6-5.7
Chrysene	12	5.6-5.7
Dibenzo(a,h)anthracene	<1	5.6-5.7
Dibenzofuran	<1	5.6-5.7
Fluoranthene	14	5.6-5.7
Fluorene	<1	5.6-5.7
Indeno(1,2,3-cd)pyrene	10	5.6-5.7
Methylnaphtalene	<1	5.6-5.7
Naphthalene	<1	5.6-5.7
Phenanthrene	6.0	5.6-5.7
Pyrene	16	5.6-5.7
Total PAHs	110.4	NA

Table 4-5. Organochlorine pesticide concentrations (μg/kg, dry wt.) of Levin Richmond sediments

Organochlorine Pesticides	LRT-SO2 COMP	Method Reporting Limit
Aldrin	<1	1
a-BHC	<1	1
b-BHC	<1.1	1.1
g-BHC (Lindane)	<1	1
d-BHC	<1	1
alpha-Chlordane	<1	1
gamma-Chlordane	<1.6	1.6
Dieldrin	3.4	1
Endosulfan I	<1	1
Endosulfan II	3.1	1
Endosulfan sulfate	<1	1
Endrin	<1	1
Endrin aldehyde	<1	1
Endrin ketone	1.4	1
Heptachlor	<1	1
Heptachlor epoxide	1.2	1
Methoxychlor	<1	1
Toxaphene	<50	50
4,4'-DDD	83	10
4,4'-DDE	20	1
4,4'-DDT	35	1
Total DDT	138	NA

Individual cores (separate report) were 140 – 290 ppb

Table 4-6. Organotin concentrations (µg/kg, dry wt.) of Levin Richmond sediments

Organotins	LRT-SO2 COMP	Method Reporting Limit
Monobutyltin	<2.3	2.3
Dibutyltin	11	2.3
Tributyltin	18	2.3
Tetrabutyltin	<2.3	2.3
Total Butyltins	29	NA

Table 4-7. PCB Aroclor concentrations (µg/kg, dry wt) of Levin Richmond sediments

PCB Aroclors	LRT-SO2 COMP	Method Reporting Limit
Aroclor 1016	<10	10
Aroclor 1221	<20	20
Aroclor 1232	<10	10
Aroclor 1242	<10	10
Aroclor 1248	<10	10
Aroclor 1254	<31	31
Aroclor 1260	<10	10
Total PCBs	<10	NA

4.1.2 Conventional and Chemical Analytical QA/QC Summary

The QA/QC review entailed reviewing the contract lab Data Reports for sample integrity, correct methodology, documentation of instrument calibration, and compliance with all appropriate quality Lab Control requirements. Although there were minimal matrix spike RPD exceedances for organochlorine pesticides, and an accuracy exceedance for one chlorinated pesticide (gamma-BHC), the overall data quality assessment found that all data were usable. Appendix B contains the conventional and chemical analysis reports, which include contract laboratory QA/QC narratives.

Any analyses that did not comply with the QA/QC limits are presented below (also, see final analytical reports in Appendix B).

Metals – Precision evaluation within acceptable limits. Matrix spike and matrix spike duplicate precision analyses were within acceptable limits.

PAHs – Internal calibration evaluation: the criterion for the analysis of 2 out of 18 PAH compounds was outside the acceptable range; however, the alternative EPA method using Relative Standard Deviation was within acceptable limits for all 18 compounds.

Chlorinated Pesticides – Internal calibration evaluation: the criterion for the analysis of 2 analytes was outside the acceptable range; however, the alternative EPA method using average percent recovery was within acceptable limits for all analytes. The method reporting limits have been raised for both samples due to matrix interference and due to the presence of non-target background components in the samples. Matrix spike recoveries and RPD for several analytes were outside acceptable range also due to matrix interference.

PCBs – Internal calibration evaluation: the criterion for the analysis of 4 PCB analytes was outside the acceptable range; however, the alternative EPA method using average percent recovery was within acceptable limits for all analytes. The matrix spike recovery for Aroclor 1260 was outside of control criteria suggesting a potential high bias in the matrix.

Organotin Compounds – The method reporting limit has been raised for Di-n-butyltin due to the presence of non-target background components in the method blank.

4.1.3 Deviations from the Sampling and Analysis Plan

There were no deviations from the SAP (PER 2005) for the analytical chemistry phase of this project.

4.2 Biological Testing

Three different toxicity tests were performed for the composite sample:

1. the 10-day amphipod survival solid-phase sediment test with *Ampelisca abdita,*
2. the 10-day juvenile polychaete survival solid-phase sediment test with *Neanthes arenaceodentata,*
3. the 48-hour water column (sediment elutriate) toxicity bivalve embryo survival and development test with *Mytilus sp..*

All tests were performed following appropriate protocols as outlined in the SAP (PER 2005). Test data and summaries of the statistical analyses for the bioassay results are provided in Appendices D-I. Summaries of test conditions and test acceptability criteria are provided in Appendix J.

4.2.1 Benthic Toxicity Testing

Solid-phase bioassays were conducted with the amphipod *Ampelisca abdita* and the polychaete *Neanthes arenaceodentata*. The measured sediment porewater ammonia concentration for the composite sample was initially greater than the recommended threshold of 15 mg/L (total ammonia). Therefore, prior to test initiation, the overlying water in each test replicate was exchanged with fresh overlying water until the measured porewater ammonia concentration was <15 mg/L. A summary of the measured concentrations of total ammonia and total sulfides in the sediment porewaters, and summary tables of the total ammonia concentrations measured in the test overlying waters are presented in Appendix C.

Positive and negative Lab Control treatments were tested concurrently with the bioassays. The positive Lab Control for both benthic species consisted of a 96-hr reference toxicant test of waterborne cadmium. The results of these tests were compared to our in-house reference toxicant test response database to determine whether these test organisms were responding to toxic stress in a typical fashion. The negative Lab Control for *Ampelisca abdita* consisted of the "Home" sediment from which the species was originally collected. The negative Lab Control for *Neanthes arenaceodentata* consisted of very fine-grained quartz sand.

For disposal suitability determinations, the solid-phase bioassay survival results for the site sediments were statistically compared to the appropriate reference site values.

The following criteria were used for suitability determinations:

1. If survival is greater in the proposed dredged sediment than in the reference site sediment(s), the proposed dredged sediments are <u>not</u> acutely toxic to benthic organisms.

2. If the difference between survival in the proposed dredged sediment and in the reference site sediment(s) is $\leq$ 20% for *A. abdita*, or $\leq$ 10% for *N. arenaceodentata*, the proposed dredged sediments are <u>not</u> acutely toxic to benthic organisms.

3. If the difference between survival in the proposed dredged sediment and in the reference site sediment(s) is > 20% for *A. abdita*, or > 10% for *N. arenaceodentata*, **<u>and</u>** the test

sediment survival is statistically significantly less than in the reference site sediments, then the test sediments are considered to be acutely toxic to benthic organisms.

4.2.1.1 Sediment Solid-Phase Testing with *Ampelisca abdita*

The survival results of these tests are summarized in Table 4-8. There was 94% survival at the "Home" sediment Lab Control treatment, indicating an acceptable survival response by the test organisms. There was 76% and 78% survival in the SF-11 and SF-10 reference site samples, respectively. There was 83% survival in the LRT-SO2 COMP site sediment composite, which was <20% less than either of the reference site sediment survival responses or the Alcatraz Environs database (92%). In addition, survival in the site sediments was <20% less than the "Home" Lab Control, further supporting that the sediments are not toxic. The test data and summary of statistical analyses for these tests are attached as Appendix D.

Table 4-8. *Ampelisca abdita* survival in the solid-phase test sediments

Sediment Site	% Survival in Test Replicates					**Overall Mean % Survival**
	Rep A	Rep B	Rep C	Rep D	Rep E	
"Home" Lab Control	100	95	95	90	90	**94**
Alcatraz (SF-11)	70	75	80	80	75	**76**
San Pablo (SF-10)	75	100	65	85	65	**78**
LRT-SO2 COMP	85	85	85	80	80	**83**

4.2.1.1.1 Reference Toxicant Toxicity to *Ampelisca abdita* - The results of the reference toxicant evaluation of the *Ampelisca abdita* used in these tests are presented in Table 4-9. Statistical analysis of the survival data indicated that the EC_{50} was 0.83 mg/L Cd. This EC_{50} value is within the "typical response" range established by the mean $\pm$ 2 SD of the 20 most recent reference toxicant tests performed in our laboratory, indicating that these test organisms were responding to toxic stress in a typical fashion. The test data and summary of statistical analyses for this test are presented in Appendix E.

Table 4-9. Reference toxicant testing: Effects of cadmium on *Ampelisca abdita* survival

Cadmium Treatment (mg/L)	Overall Mean % Survival
Lab Control	85
0.125	70
0.25	70
0.5	60
1*	**30***
2*	**0***
4*	**0***
EC_{50} =	**0.83 mg/L Cd**

* - Significantly less than the Lab Control at $p < 0.05$.

4.2.1.2 Sediment Solid-Phase Testing with *Neanthes arenaceodentata*

The survival results of these tests are summarized in Table 4.10. There was 98% survival at the Lab Control treatment, indicating an acceptable survival response by the test organisms. There was 100% in the SF-11 and SF-10 reference site sediments. There was 96% survival in the LRT-SO2 COMP site sediment composite samples, which was <10% less than either of the reference site sediment survival responses. In addition, survival in the site sediments was <10% less than the Lab Control, further supporting that the sediments are not toxic. The test data and summary of statistical analyses for these tests are attached as Appendix F.

Table 4-10. *Neanthes arenaceodentata* survival in the test sediments

Sediment Site	% Survival in Test Replicates					**Overall Mean % Survival**
	Rep A	Rep B	Rep C	Rep D	Rep E	
"Home" Lab Control	100	90	100	100	100	**98**
Alcatraz (SF-11)	100	100	100	100	100	**100**
San Pablo (SF-10)	100	100	100	100	100	**100**
LRT-SO2 COMP	100	100	90	90	100	**96**

4.2.1.2.1 Reference Toxicant Toxicity to *Neanthes arenaceodentata* - The results of the reference toxicant evaluation of the *Neanthes arenaceodentata* used in these tests are presented in Table 4-11. Statistical analysis of the survival data indicated the EC_{50} was 5.6 mg/L Cd, which is within the "typical response" range established by the mean $\pm$ 2 SD of the 20 most recent previous tests performed in our laboratory. This reference toxicant response indicates that these

organisms were responding to toxicant stress in a typical fashion. The test data and summary of statistical analyses for this test are presented in Appendix G.

Table 4-11. Reference toxicant testing: Effects of cadmium on *Neanthes arenaceodentata* survival

Cadmium Treatment (mg/L)	Overall Mean % Survival
Lab Control	100
1	100
2	100
4	100
8*	**0***
16*	**0***
EC_{50} =	5.6 mg/L Cd

* - Significantly less than the Lab Control at $p < 0.05$

4.2.2 Water Column Toxicity Testing

The 48-hour bivalve embryo development toxicity test was performed to assess the effects of dredged material disposal in the water column. Positive and negative Lab Control treatments were tested concurrently with the site sediment elutriate. The positive Lab Control consisted of a 'waterborne' reference toxicant test; the results of this test were compared to our in-house reference toxicant test response database to determine whether these test organisms were responding to toxic stress in a typical fashion. The negative Lab Control consisted of 0.45 μm-filtered natural seawater (obtained from the U.C. Davis Bodega Bay Marine Laboratory), diluted to a test salinity of 30 ppt via addition of reverse-osmosis de-ionized water.

The test results for the sediment composite elutriate were compared with the test organism responses at the negative Lab Control treatment to determine the potential impact of the proposed dredged materials on pelagic organisms at and beyond the boundaries of the disposal site (USEPA/USACE 1998). The following criteria were used for suitability determinations:

1. If survival and/or normal development in the sediment composite 100% elutriates is equal to or greater than the test organism responses in the negative Lab Control treatment, the dredged material is <u>not</u> predicted to be acutely toxic to water column organisms.

2. If survival and/or normal development in the sediment composite 100% elutriates is <10% less than the test response of the negative Lab Control treatment, the dredged material is

organisms were responding to toxicant stress in a typical fashion. The test data and summary of statistical analyses for this test are presented in Appendix G.

Table 4-11. Reference toxicant testing: Effects of cadmium on *Neanthes arenaceodentata* survival

Cadmium Treatment (mg/L)	Overall Mean % Survival
Lab Control	100
1	100
2	100
4	100
8*	**0***
16*	**0***
EC_{50} =	5.6 mg/L Cd

* - Significantly less than the Lab Control at $p < 0.05$

4.2.2 Water Column Toxicity Testing

The 48-hour bivalve embryo development toxicity test was performed to assess the effects of dredged material disposal in the water column. Positive and negative Lab Control treatments were tested concurrently with the site sediment elutriate. The ~~positive Lab~~ Control consisted of a 'waterborne' reference toxicant test; the results of this test were compared to our in-house reference toxicant test response database to determine whether these test organisms were responding to toxic stress in a typical fashion. The negative Lab Control consisted of 0.45 μm-filtered natural seawater (obtained from the U.C. Davis Bodega Bay Marine Laboratory), diluted to a test salinity of 30 ppt via addition of reverse-osmosis de-ionized water.

The test results for the sediment composite elutriate were compared with the test organism responses at the negative Lab Control treatment to determine the potential impact of the proposed dredged materials on pelagic organisms at and beyond the boundaries of the disposal site (USEPA/USACE 1998). The following criteria were used for suitability determinations:

1. If survival and/or normal development in the sediment composite 100% elutriates is equal to or greater than the test organism responses in the negative Lab Control treatment, the dredged material is <u>not</u> predicted to be acutely toxic to water column organisms.

2. If survival and/or normal development in the sediment composite 100% elutriates is <10% less than the test response of the negative Lab Control treatment, the dredged material is

4.2.2.1.1 Reference Toxicant Toxicity to *Mytilus sp.* Embryos - The embryo development results of this test are summarized in Table 4-13. Briefly, there was 90.3% normal embryo development at the Lab Control treatment. The EC50 was 7.5 µg/L Cu, which is within the "typical response" range established by the mean ± 2 SD of the 20 most recent previous tests performed in our laboratory, indicating that these test organisms were responding to toxic stress in a typical fashion. The test data and summary of statistical analyses for this test are attached as Appendix I.

Table 4-13. Reference toxicant testing: Effects of copper on *Mytilus sp.* embryo development

Copper Treatment (µg/L)	Mean % Normal Embryo Development
Lab Control	91
1.25	91
2.5	88
5	89
10*	**2***
15*	**0***
20*	**0***
EC50 =	7.5 µg/L Cu

* - Significantly less than the Lab Control treatment response at p <0.05

4.2.3 Biological Testing Quality Lab Control

The biological testing of the sediments with these test species incorporated standard QA/QC procedures to ensure that the test results were valid. Standard QA/QC procedures included the use of negative Lab Controls, positive Lab Controls, test replicates, and measurements of water quality during testing.

Quality assurance procedures that were used for sediment testing are consistent with methods described in the U.S.EPA/ACOE (1991) and U.S.EPA/ACOE (1998). The methods employed in this sediment testing program are detailed in standard guides and procedures maintained in the analytical laboratory.

Sediments for the bioassay testing were stored appropriately at ≤4°C and were used within the 8-week holding time period. The sediment interstitial water characteristics were within test

acceptability limits at the start of the tests. The sediment elutriates were prepared using site water.

All measurements of routine water quality characteristics were performed as described in the PER Lab Standard Operating Procedures (SOPs). All biological testing water quality conditions were within the appropriate limits. Laboratory instruments were calibrated daily according to Lab SOPs, and calibration data were logged and initialed.

Negative Lab Control - The biological responses for all of the test organisms at the negative Lab Control treatments were within acceptable limits.

Positive Lab Control - The accuracy of the responses of the test organisms to toxic stress was evaluated using positive Lab Controls (reference toxicant testing). The key test dose-response EC point estimates determined for the test organisms were within the reference toxicant test "typical response" ranges, indicating that these test species were responding to toxic stress in a typical fashion.

A summary of key reference toxicant database values for *A. abdita*, *N. arenaceodentata,* and *Mytilus sp,* are presented in Tables 4-14 through 4-16, respectively.

Table 4-14. Summary of Reference Toxicant Database for *Ampelisca abdita*

Mean EC_{50}	Standard Deviation	Lower Limit (mean - 2SD)	Upper Limit (mean + 2SD)	Current EC_{50}
0.39 mg/L	0.51 mg/L	0.13 mg/L	1.15 mg/L	0.83 mg/L

Table 4-15. Summary of Reference Toxicant Database for *Neanthes arenaceodentata*

Mean EC_{50}	Standard Deviation	Lower Limit (mean - 2SD)	Upper Limit (mean + 2SD)	Current EC_{50}
6.0 mg/L	1.9 mg/L	4.4 mg/L	8.2 mg/L	5.6 mg/L

Table 4-16. Summary of Reference Toxicant Database for *Mytilus sp.*

Mean EC_{50}	Standard Deviation	Lower Limit (mean - 2SD)	Upper Limit (mean + 2SD)	Current EC_{50}
12.0 mg/L	7.4 mg/L	6.7 mg/L	21.5 mg/L	7.5 mg/L

5. SUMMARY

A composite sediment sample from the Shore Terminal area was submitted for full chemical and conventional analyses and biological testing. With the exception of total DDT and total butyltins, all analytical chemistry results were generally within the ambient background concentration ranges for San Francisco Bay (SFRWQCB 2000).

Results from the amphipod and polychaete solid phase bioassays showed no evidence of increased mortality in test sediments compared to either reference sediments or the Alcatraz environs database. Results of water-column toxicity bioassays of the sediment elutriates indicated that narrative water quality limits would be met for unconfined aquatic disposal.

6. REFERENCES

PER 2005. Sediment Characterization Sampling and Analysis Plan for the LEVIN Richmond Terminal. Pacific EcoRisk, Martinez, CA.

SFRWQCB. 2000. Beneficial Reuse of Dredged Materials Sediment Screening and Testing Guidelines: Draft Staff Report. San Francisco Regional Water Quality Lab Control Board, Oakland, CA.

USEPA/USACE. 1998. Evaluation of dredged material proposed for discharge in waters of the U.S. – testing manual – Inland Testing Manual. U.S. Environmental Protection Agency/U.S. Army Corps of Engineers. EPA-823-B-94-002. U.S. Environmental Protection Agency, Office of Water (4305)

Appendix A

Sampling Field Logs and Data Sheets

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
835 Arnold Drive, Suite 104
Martinez, Ca 94553
Phone: (925) 313-8080
Fax: (925) 313-8089

Sediment Core Collection Form

Station ID: LRT-502-01 **Date:** 10-17-05

Project Name: Levin Terminal **Project No.:** 10649

Vertical Datum: MLLW MLW Other:

Depth Measurement: Sounder Leadline

Project Depth: 38 **Overdredge:** 2

	Attempt 1	Attempt ___	Attempt ___
Time:	12:01		
Latitude/Northing	37°55.089		
Longitude/Easting	~~122°21.884~~	122°21.882	
(A) Measured Water Depth (ft)	40.2		
(B) Tide Height (ft)	6.5		
(C) Mudline Elevation (A–B=C)	33.7		
(D) Calculated Core Length (ft) (PD+OD-C=D)	6.3		
Estimated Penetration (ft)	6.3		
Refusal Encountered?	Y (N)	Y N	Y N
Total Core Length Recovered (ft)	6.3		

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, (silt clay), organic matter	cobble, gravel, sand C M F, silt clay, organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	(gray), black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	(None), slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Homogenous (H)/Layering (L)	(H) L	H L	H L
Comments: Homogenized and composited on 10/25/05			

Recorded by: AB

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
835 Arnold Drive, Suite 104
Martinez, Ca 94553
Phone: (925) 313-8080
Fax: (925) 313-8089

Sediment Core Collection Form

Station ID: LRT-S02-02 **Date:** 10-17-05

Project Name: Levin Terminal **Project No.:** 10649

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 38 **Overdredge:** 2

	Attempt 1	Attempt ___	Attempt ___
Time:	1122		
Latitude/Northing	37°55.079		
Longitude/Easting	122°21.845		
(A) Measured Water Depth (ft)	39.8		
(B) Tide Height (ft)	6.2		
(C) Mudline Elevation (A–B=C)	33.6		
(D) Calculated Core Length (ft) (PD+OD-C=D)	6.4		
Estimated Penetration (ft)	6.4		
Refusal Encountered?	Y N	Y N	Y N
Total Core Length Recovered (ft)	6.4		

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, (silt clay), organic matter	cobble, gravel, sand C M F, silt clay, organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	(gray), black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	(None), slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Homogenous (H)/Layering (L)	(H) L	H L	H L
Comments: ~40 ft from catwalk ~64y from W. End of dock	Homogenized and composited 10/26/05 AB 25		

Recorded by: AB

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
835 Arnold Drive, Suite 104
Martinez, Ca 94553
Phone: (925) 313-8080
Fax: (925) 313-8089

Sediment Core Collection Form

Station ID: CRT-02-03 **Date:** 10/17/05

Project Name: Levin Terminal **Project No.:** 10649

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: Sounder (Leadline)

Project Depth: 38 **Overdredge:** 2

	Attempt 1	Attempt ___	Attempt ___
Time:	10:36		
Latitude/Northing	37°55.670		
Longitude/Easting	122°21.831		
(A) Measured Water Depth (ft)	39.1		
(B) Tide Height (ft)	5.6		
(C) Mudline Elevation (A–B=C)	33.5		
(D) Calculated Core Length (ft) (PD+OD-C=D)	6.5		
Estimated Penetration (ft)	6.5		
Refusal Encountered?	Y (N)	Y N	Y N
Total Core Length Recovered (ft)	6.5		

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, (silt clay), organic matter	cobble, gravel, sand C M F, silt clay, organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	(gray), black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	(None), slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Homogenous (H)/Layering (L)	(H) L	H L	H L
Comments: 63 yrds Homogenized and composited 10/25/05			

Recorded by: AB

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
835 Arnold Drive, Suite 104
Martinez, Ca 94553
Phone: (925) 313-8080
Fax: (925) 313-8089

Sediment Core Collection Form

Station ID: LRT-SC2-04 **Date:** 10-17-05

Project Name: Levin Terminal **Project No.:** 10649

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: (Sounder) Leadline

Project Depth: 38 **Overdredge:** 2

	Attempt 1	Attempt ___	Attempt ___
Time:	0943		
Latitude/Northing	37° 55.066		
Longitude/Easting	122° 21.809		
(A) Measured Water Depth (ft)	36.9		
(B) Tide Height (ft)	4.5		
(C) Mudline Elevation (A–B=C)	32.4		
(D) Calculated Core Length (ft) (PD+OD-C=D)	7.6		
Estimated Penetration (ft)	8ft 9in		
Refusal Encountered?	Y (N)	Y N	Y N
Total Core Length Recovered (ft)	8ft 9in *		

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, (silt clay), organic matter	cobble, gravel, sand C M F, silt clay, organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	(gray), black, (brown), brown surface, olivine	gray, black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	(None), slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Homogenous (H)/Layering (L)	H (L)	H L	H L

Comments: 33 yards to E. piling 20y to catwalk
54 yards to E. end of dock
Lower 40in of core L. brown w/small clumps of clay
* 7.6 ft used Homogenized and composited 10/25/05

Recorded by: Alison Briden

Pacific EcoRisk
Environmental Consulting and Testing

Pacific EcoRisk
835 Arnold Drive, Suite 104
Martinez, Ca 94553
Phone: (925) 313-8080
Fax: (925) 313-8089

Sediment Core Collection Form

Station ID: LRT-SD2-05 **Date:** 10-17-05

Project Name: Levin Terminal **Project No.:**

Vertical Datum: (MLLW) MLW Other:

Depth Measurement: (Sounder) Leadline

Project Depth: 38 **Overdredge:** 2

	Attempt 1	Attempt ___	Attempt ___
Time:	1533		
Latitude/Northing	37° 55.059		
Longitude/Easting	122° 21.790		
(A) Measured Water Depth (ft)	~~33.2~~ ft 31.9		
(B) Tide Height (ft)	2.9		
(C) Mudline Elevation (A–B=C)	~~30.1~~ 29		
(D) Calculated Core Length (ft) (PD+OD-C=D)	40 - ~~30.1~~ 29 = ~~9.9~~ 11		
Estimated Penetration (ft)	~~10 ft~~ 11		
Refusal Encountered?	Y N	Y N	Y N
Total Core Length Recovered (ft)	10ft 8in		

Core Characteristics

Sediment Type	cobble, gravel, sand C M F, (silt clay) organic matter	cobble, gravel, sand C M F, silt clay, organic matter	cobble, gravel, sand C M F, silt clay, organic matter
Sediment Color	gray, black, (brown), brown surface, olivine	gray, black, brown, brown surface, olivine	gray, black, brown, brown surface, olivine
Sediment Odor	(None) slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic	None, slight, mod, strong H_2S, petroleum, septic
Homogenous (H)/Layering (L)	H (L) 2 layers	H L	H L
Comments: Boat's GPS: 37° 55.055 122° 21.790 27-30 yards off E piling 87 yards E of dock. Sandy gravel at very bottom of core			

Recorded by: Alison Briden

Appendix B

Analytical Chemistry Laboratory Data Report

1317 South 13th Avenue P.O. Box 479 Kelso, Washington 98626 (360) 577-7222 (360) 636-1068 fax

Columbia Analytical Services INC.
An Employee - Owned Company

April 20, 2006 Service Request No: K0505291-b

Jeffrey Cotsifas
Pacific Eco-Risk Laboratories
835 Arnold Dr.
Suite 104
Martinez, CA 94553

RE: LRTC

Dear Jeffrey:

Enclosed are the results of the sample submitted to our laboratory on October 28, 2005. For your reference, these analyses have been assigned our service request number K0505291.

All analyses were performed according to our laboratory's quality assurance program. The test results meet requirements of the NELAC standards except as noted in the case narrative report. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3358.

Respectfully submitted,

Columbia Analytical Services, Inc.

Lynda Huckestein
Client Services Manager

LH/jeb

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL has been elevated due to a matrix interference.
X	See case narrative.
*	The duplicate analysis not within control limits. See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
i	The MRL/MDL has been elevated due to a chromatographic interference.
X	See case narrative.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Case Narrative

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Pacific Eco-Risk Laboratories	**Service Request No.:**	K0505291
Project:	LRTC	**Date Received:**	10/28/05
Sample Matrix:	Sediment		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), Matrix/Duplicate Matrix Spike (MS/DMS), and Laboratory Control Sample (LCS).

Sample Receipt

One sediment sample was received for analysis at Columbia Analytical Services on 10/28/05. The sample was received in good condition and consistent with the accompanying chain of custody form. The sample was stored frozen by Pacific Eco-Risk Laboratories prior to shipment to the laboratory.

General Chemistry Parameters

No anomalies associated with the analysis of these samples were observed.

Total Metals

No anomalies associated with the analysis of these samples were observed.

Organochlorine Pesticides by EPA Method 8081A

Continuing Calibration Verification Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Continuing Calibration Verification (CCV) 1129F004: Tetrachloro-m-xylene and 1129F019: Tetrachloro-m-xylene,. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

Sample Confirmation Notes:
The confirmation comparison criterion of 40% difference for a few analytes was exceeded in sample LRT-S02 Comp. The higher of the two values is reported when no evidence of a peak anomaly was observed; the lower of the two values was reported when an apparent interference on the alternate column produced a higher value.

Elevated Method Reporting Limits:
The reporting limit is elevated for several analytes in sample LRT-S02 Comp. The chromatogram indicated the presence of non-target background components. The matrix interference prevented adequate resolution of the target compounds at the reporting limit. The results are flagged to indicate the matrix interference.

Approved by _____ **Date** 4/20/06

The reporting limit is elevated for all analytes in sample LRT-S02 Comp. The sample extract was diluted prior to instrumental analysis due to relatively high levels of non-target background components. The extract was highly colored and viscous, which indicated the need to perform a dilution prior to injection into the instrument. Clean-up of the extract was performed within the scope of the method, but did not eliminate enough of the background components to prevent dilution. A semi-quantitative screen was performed prior to final analysis. The results of the screening indicated the need to perform a dilution. The results are flagged to indicate the matrix interference.

Matrix Spike Recovery and Relative Percent Difference Exceptions:
The matrix spike recoveries and relative percent difference of several analytes for sample Batch QC were outside control criteria because of suspected matrix interference. Sample was black, thick and oily and required a dilution prior to GPC. As a result of the interference, the results for these analytes might contain a low or high bias. No further corrective action was taken.

The control criteria for matrix spike recoveries of Aldrin, 4,4'-DDD, and Methoxychlor for sample Batch QC are not applicable. The analyte concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

PCB Aroclors by EPA Method 8082

Continuing Calibration Verification Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Continuing Calibration Verification (CCV) 1115F003, 1115F020, 1115F048: Decachlorobiphenyl. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the average percent recovery of all analytes in the verification standard. The standard meets the alternative evaluation criteria.

Elevated Method Reporting Limits:
The reporting limit is elevated for Aroclor 1254 in sample LRT-S02 Comp. The chromatogram indicated the presence of organochlorine pesticides and other non-target background components. The matrix interference prevented adequate resolution of the target compounds at the reporting limit. The results are flagged to indicate the matrix interference.

Matrix Spike Recovery Exceptions:
The matrix spike recoveries of Aroclor 1260 for sample Batch QC were outside control criteria. Recovery in the Laboratory Control Sample (LCS) was acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential high bias in this matrix. All sample results were ND for this service request, no further corrective action was appropriate.

Organotin Compounds

Continuing Calibration Verification Exceptions:
The analysis of Butyltins requires the use of dual column confirmation. When the Continuing Calibration Verification (CCV) criteria is met for both columns, the higher of the two sample results is generally reported. The primary evaluation criteria were not met on the confirmation column for Tri-n-propyltin. The results are reported from the column with an acceptable CCV. The data quality is not affected. No further corrective action was necessary.

Elevated Method Reporting Limits:
The reporting limit is elevated for Di-n-butyltin in Method Blank (MB) KWG0518939-4. The chromatogram indicated the presence of non-target background components. The matrix interference prevented adequate resolution of the target compound at the reporting limit. The result is flagged to indicate the matrix interference.

Polynuclear Aromatic Hydrocarbons by EPA Method 8270C

Initial Calibration Exceptions:
The primary evaluation criterion was exceeded for the following analytes in Initial Calibration (ICAL) ID CAL4880: 2-Methylnaphthalene, Dibenz(a,h)anthracene. In accordance with CAS standard operating procedures, the alternative evaluation specified in the EPA method was performed using the mean Relative Standard Deviation (RSD) of all analytes in the calibration. The result of the mean RSD calculation was 12.3%. The calibration meets the alternative evaluation criteria. Note that CAS/Kelso policy does not allow the use of averaging if any analyte in the ICAL exceeds 30% RSD.

Approved by MK **Date** 4/20/06

Chain of Custody
Documentation

K05052 91

CHAIN OF CUSTODY RECORD

5-000-000

PACIFIC ECORISK
835 Arnold Drive, Suite 104
Martinez, CA 94553
(925)313-8080 fax: (925)313-8089

RESULTS TO:
PER
835 Arnold Dr Suite 104
Martinez, CA 94553
Attn: Jeff Cotsifas Tel: 925-313-8080

BILL TO:
PER
Attn: _____ Tel: _____

PROJECT: LRTC

SAMPLE IDENTIFICATION	DATE	TIME	SAMPLE MATRIX	GRAB/ COMP.	# CONTAINERS/TYPE	ANALYSES REQUESTED: Grain Size	ANALYSES REQUESTED: Analytical	REMARKS
LRT-S01 Comp	10/17/05	—	Sed	Comp	1 / 1 bag	X		
LRT-S02 Comp	10/17/05	—	Sed	Comp	1 / 1 bag	X		
LRT-S01 Comp	10/17/05	—	Sed	Comp	1 / 1500mL glass		X	
LRT-S02 Comp	10/17/05	—	Sed	Comp	1 / 1500 mL glass		X	
					/			
					/			
					/			
					/			
					/			
					/			
					/			

METHOD OF SHIPMENT: FED X _____ UPS _____ HAND _____ OTHER _____

COMMENTS: * Please call for specific analyses on analytical samples

CODES:

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	PAGE #
Alan Black	10/27/05	1535	Tracy Blunk CAS	10/28/05	1000	OF

White - Return w/sample

Yellow: - Keep for your records

ANALYTE LIST

Pacific EcoRisk
835 Arnold Drive, Ste. 104
Martinez, CA 94553

Project Proponent: **Pacific EcoRisk**

Project #: 10649

Site #: LRT-S01 and LRT-S02

STANDARD LIST

Arsenic	6020	X
Cadmium	6020	X
Chromium	6020	X
Copper	6020	X
Lead	6020	X
Mercury	7471	X
Nickel	6020	X
Selenium	7742	X
Silver	6020	X
Zinc	6020	X
Sulfides, dissolved	4500S-M	
Butyltins (Tetra-mono)	Krone et al	X
TOC	Plumb 1981/ASTM	X
Grain Size	Plumb 1981/ASTM	X
Pesticides	8081A	X
PCBs	8082	X
PAHs	8270C-SIM	X
Total Solids	SMEWW 2540 B	X

ADDITIONAL TESTS

WET Metals (DI Water)	CAM*	
TRPH	418.2	
Sulfides, total	4500S	
Phthalates	8270	
Phenols	8270	

* Samples analyzed for metals listed above.

If you have any questions regarding this request as checked, please call Jeff Cotsifas at (925) 313-8080.

(Rev. 12/01)

00010

00010

Columbia Analytical Services Inc.
Cooler Receipt and Preservation Form

PC Lynden

Project/Client Pac Energy Service Request K05 5291

Cooler received on 10/26/07 and opened on 10/28/07 by FBlanc

1.	Were custody seals on outside of coolers?				Y	(N)
	If yes, how many and where?					
2.	Were custody seals intact?				Y	(N)
3.	Were signature and date present on the custody seals?				Y	(N)
4.	Is the shipper's airbill available and filed? If no, record airbill number:				(Y)	N
5.	COC#					
	Temperature of cooler(s) upon receipt: (°C)	4.6				
	Temperature Blank: (°C)	NA				
	Were samples hand delivered on the same day as collection?				Y	(N)
6.	Were custody papers properly filled out (ink, signed, etc.)?				(Y)	N
7.	Type of packing material present gelpacks - bmrp					
8.	**Did all bottles arrive in good condition (unbroken)?**				(Y)	N
9.	Were all bottle labels complete (i.e analysis, preservation, etc.)?				(Y)	N
10.	Did all bottle labels and tags agree with custody papers?				(Y)	N
11.	**Were the correct types of bottles used for the tests indicated?**				(Y)	N
12.	Were all of the preserved bottles received at the lab with the appropriate pH?				~~Y~~	~~N~~
13.	Were VOA vials checked for absence of air bubbles, and if present, noted below?				~~Y~~	~~N~~
14.	Were the 1631 Mercury bottles checked for absence of air bubbles, and if present, noted below?				~~Y~~	~~N~~
15.	Did the bottles originate from CAS/K or a branch laboratory?				(Y)	N
16.	**Are CWA Microbiology samples received with >1/2 the 24hr. hold time remaining from collection?**				~~Y~~	~~N~~
17.	Was C12/Res negative?				~~Y~~	~~N~~

Explain any discrepancies: 1 liter jar received for UST-2-Comp - able to contain.

RESOLUTION:

Samples that required preservation or received out of temperature:

Sample ID	Reagent	Volume	Lot Number	Bottle Type	Rec'd out of Temperature	Initials

00011
00011

Total Solids

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
LRT-S02 Comp	K0505291-002	10/17/2005	10/28/2005	10/31/2005	44.7	

00013

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Pacific Eco-Risk Laboratories	**Service Request:**	K0505291B
Project:	LRTC	**Date Collected:**	10/17/2005
Sample Matrix:	Soil	**Date Received:**	10/28/2005
		Date Analyzed:	10/31/2005

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
LRT-S02 Comp	K0505291-002	44.7	44.9	44.8	<1	

00014

General Chemistry Parameters

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client : Pacific Eco-Risk Laboratories
Project Name : LRTC
Project Number : NA
Sample Matrix : SEDIMENT

Service Request : K0505291
Date Collected : 10/17/05
Date Received : 10/28/05

Carbon, Total Organic

Analysis Method : ASTM D4129-82M
Test Notes :

Units : PERCENT
Basis : Dry

Sample Name	Lab Code	MRL	Dilution Factor	Date Analyzed	Result	Result Notes
LRT-S02 Comp	K0505291-002	0.05	1	11/09/05	1.14	
Method Blank	K0505291-MB	0.05	1	11/09/05	ND	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Pacific Eco-Risk Laboratories
Project Name : LRTC
Project Number : NA
Sample Matrix : SEDIMENT

Service Request : K0505291
Date Collected : 10/17/05
Date Received : 10/28/05
Date Prepared : 11/04/05
Date Analyzed : 11/09/05

Duplicate Summary
Inorganic Parameters

Sample Name : Batch QC
Lab Code : K0505291-001DUP
Test Notes :

Units : PERCENT
Basis : Dry

Analyte	Analysis Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
Carbon, Total Organic	ASTM D4129-82M	0.05	1.72	2.03	1.88	16	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client : Pacific Eco-Risk Laboratories
Project Name : LRTC
Project Number : NA
Sample Matrix : SEDIMENT

Service Request : K0505291
Date Collected : 10/17/05
Date Received : 10/28/05
Date Prepared : 11/04/05
Date Analyzed : 11/09/05

Matrix Spike Summary
Inorganic Parameters

Sample Name : Batch QC
Lab Code : K0505291-001MS
Test Notes :

Units : PERCENT
Basis : Dry

Analyte	Analysis Method	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Carbon, Total Organic	ASTM D4129-82M	0.05	7.93	1.72	8.84	90	75-125	

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client :	Pacific Eco-Risk Laboratories	**Service Request :**	K0505291
Project Name :	LRTC	**Date Collected :**	NA
Project Number :	NA	**Date Received :**	NA
Sample Matrix :	SEDIMENT	**Date Prepared :**	11/04/05
		Date Analyzed :	11/09/05

Laboratory Control Sample Summary
Inorganic Parameters

Sample Name :	Laboratory Control Sample	Units :	PERCENT
Lab Code :	K0505291-LCS	Basis :	Dry

Test Notes :

Analyte	Prep Method	Analysis Method	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Limits	Result Notes
Carbon, Total Organic	Method	ASTM D4129-82M	0.75	0.73	97	85-115	

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291
Date Collected: 10/17/2005
Date Received: 10/28/2005
Date Analyzed: 11/18/2005

Particle Size Determination
ASTM Method D422 Modified

Sample Name: LRT-S02 Comp
Lab Code: K0505291-002

Sand Fraction: Weight (Grams)	2.2471
Sand Fraction: Weight Recovered (Grams)	2.2740
Sand Fraction: Percent Recovery	101

Weight as received (Grams)	35.1376
Percent Solids	46.0
Weight Oven-Dried (Grams)	16.1633

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0000	0.00
Gravel, Fine	2.00 mm	10	0.0000	0.00
Sand, Very Coarse	0.850 mm	20	0.2734	1.69
Sand, Coarse	0.425 mm	40	0.8071	4.99
Sand, Medium	0.250 mm	60	0.3221	1.99
Sand, Fine	0.106 mm	140	0.4732	2.93
Sand, Very Fine	0.075 mm	200	0.2668	1.65
Silt			6.2150	38.5
Clay			8.0100	49.6
		Total	16.3676	101

Approved By: _____ Date: _____

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291
Date Collected: 10/17/2005
Date Received: 10/28/2005
Date Analyzed: 11/18/2005

Particle Size Determination
ASTM Method D422 Modified

Sample Name: Batch QC
Lab Code: K0505291-001

Sand Fraction: Weight (Grams)	4.1079
Sand Fraction: Weight Recovered (Grams)	4.1066
Sand Fraction: Percent Recovery	100

Weight as received (Grams)	40.0186
Percent Solids	46.3
Weight Oven-Dried (Grams)	18.5286

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.0324	0.17
Gravel, Fine	2.00 mm	10	0.5797	3.13
Sand, Very Coarse	0.850 mm	20	0.6623	3.57
Sand, Coarse	0.425 mm	40	0.4757	2.57
Sand, Medium	0.250 mm	60	0.5739	3.10
Sand, Fine	0.106 mm	140	1.2331	6.66
Sand, Very Fine	0.075 mm	200	0.4174	2.25
Silt			5.5750	30.1
Clay			8.5350	46.1
		Total	18.0845	97.6

Approved By: _____ Date: _____

00021

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291
Date Collected: 10/17/2005
Date Received: 10/28/2005
Date Analyzed: 11/18/2005

Particle Size Determination
ASTM Method D422 Modified

Sample Name: Batch QC
Lab Code: K0505291-001DUP

Sand Fraction: Weight (Grams)	4.7509
Sand Fraction: Weight Recovered (Grams)	4.7019
Sand Fraction: Percent Recovery	99.0

Weight as received (Grams)	40.1161
Percent Solids	46.3
Weight Oven-Dried (Grams)	18.5738

Description	Sieve Size	Sieve Number	Dry Weight (Grams)	Percent of Total Weight Recovered
Gravel, Medium	4.75 mm	4	0.8112	4.37
Gravel, Fine	2.00 mm	10	0.7124	3.84
Sand, Very Coarse	0.850 mm	20	0.5581	3.00
Sand, Coarse	0.425 mm	40	0.4319	2.33
Sand, Medium	0.250 mm	60	0.5415	2.92
Sand, Fine	0.106 mm	140	1.1381	6.13
Sand, Very Fine	0.075 mm	200	0.4098	2.21
Silt			5.9500	32.0
Clay			8.5300	45.9
		Total	19.0830	103

Approved By: _____ Date: _____

00022

Metals

METALS

- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

Client: Pacific Eco-Risk Laboratories Service Request: K0505291

Project No.:

Project Name: LRTC

Sample No.	Lab Sample ID.	
Batch QCD	K0505047-003D	
Batch QCS	K0505047-003S	
~~LRT-S01 Comp~~	~~K0505291-001~~	ML 4/20/06
LRT-S02 Comp	K0505291-002	
Method Blank	K0505291-MB	
Batch QCD	K0505572-026D	
Batch QCS	K0505572-026S	

Were ICP interelement corrections applied? Yes/No YES

Were ICP background corrections applied? Yes/No YES

If yes-were raw data generated before application of background corrections? Yes/No NO

Comments:

Signature: Ellen M Arnold Date: 11/23/05

00024

METALS

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INORGANIC ANALYSIS DATA SHEET

Client: Pacific Eco-Risk Laboratories
Project No.: NA
Project Name: LRTC
Matrix: SEDIMENT

Service Request: K0505291
Date Collected: 10/17/05
Date Received: 10/28/05
Units: MG/KG
Basis: Dry

Sample Name: LRT-S02 Comp
Lab Code: K0505291-002

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6020	0.5	5	11/15/05	11/16/05	7.0		
Cadmium	6020	0.05	5	11/15/05	11/16/05	0.40		
Chromium	6020	1.0	25	11/15/05	11/16/05	83.0		
Copper	6020	0.1	5	11/15/05	11/16/05	39.3		
Lead	6020	0.05	5	11/15/05	11/16/05	30.1		
Mercury	7471A	0.02	1	11/1/05	11/7/05	0.35		
Nickel	6020	0.2	5	11/15/05	11/16/05	59.7		
Selenium	7742	0.1	2	11/10/05	11/22/05	0.2		
Silver	6020	0.02	5	11/10/05	11/17/05	0.38		
Zinc	6020	0.5	5	11/15/05	11/16/05	82.8		

% Solids: 44.7

Comments:

METALS

-1-

INORGANIC ANALYSIS DATA SHEET

Client: Pacific Eco-Risk Laboratories
Project No.: NA
Project Name: LRTC
Matrix: SOIL

Service Request: K0505291
Date Collected:
Date Received:
Units: MG/KG
Basis: Dry

Sample Name: Method Blank
Lab Code: K0505291-MB

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6020	0.5	5	11/15/05	11/16/05	0.5	U	
Cadmium	6020	0.05	5	11/15/05	11/16/05	0.05	U	
Chromium	6020	0.2	5	11/15/05	11/16/05	0.2	U	
Copper	6020	0.1	5	11/15/05	11/16/05	0.1	U	
Lead	6020	0.05	5	11/15/05	11/16/05	0.05	U	
Mercury	7471A	0.02	1	11/1/05	11/7/05	0.02	U	
Nickel	6020	0.2	5	11/15/05	11/16/05	0.2	U	
Selenium	7742	0.1	2	11/10/05	11/22/05	0.1	U	
Silver	6020	0.02	5	11/10/05	11/17/05	0.02	U	
Zinc	6020	0.5	5	11/15/05	11/16/05	0.5	U	

% Solids: 100.0

Comments:

METALS
- 5a -
SPIKE SAMPLE RECOVERY

Client: Pacific Eco-Risk Laboratories
Service Request: K0505291
Project No.:
Units: mg/kg
Project Name: LRTC
Basis: Dry
Matrix: SEDIMENT
% Solids: 72.7

Sample Name: Batch QCS
Lab Code: K0505572-026S

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Arsenic	70 - 122	118		4.1		113	101		6020
Cadmium	77 - 122	11.6		0.08		11.3	102		6020
Chromium	67 - 138	88.1		28.1		45.1	133		6020
Copper	50 - 142	65.3		6.5		56.4	104		6020
Lead	74 - 117	126		9.87		113	103		6020
Mercury	61 - 129	0.60		0.16		0.48	91		7471A
Nickel	73 - 121	152		33.2		113	105		6020
Selenium	64 - 120	112		0.1	U	115	97		7742
Silver	70 - 130	11.0		0.04		11.3	97		6020
Zinc	51 - 153	138		27.3		113	98		6020

An empty field in the Control Limit column indicates the control limit is not applicable.

METALS
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DUPLICATES

Client: Pacific Eco-Risk Laboratories
Project No.:
Project Name: LRTC
Matrix: SEDIMENT

Service Request: K0505291
Units: mg/kg
Basis: Dry
% Solids: 72.7

Sample Name: Batch QCD
Lab Code: K0505572-026D

Analyte	Control Limit(%)	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Arsenic	30	4.1		4.3		5		6020
Cadmium		0.08		0.07		8		6020
Chromium	30	28.1		29.3		5		6020
Copper	30	6.5		6.8		5		6020
Lead	30	9.87		10.2		3		6020
Mercury	30	0.16		0.16		1		7471A
Nickel	30	33.2		35.4		6		6020
Selenium		0.1	U	0.1	U			7742
Silver		0.04		0.02		47		6020
Zinc	30	27.3		28.2		3		6020

00028

An empty field in the Control Limit column indicates the control limit is not applicable.

00029

METALS

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LABORATORY CONTROL SAMPLE

Client: Pacific Eco-Risk Laboratories Service Request: K0505291

Project No.:

Project Name: LRTC

queous LCS Source: Inorganic Ventures Solid LCS Source: ERA Lot #246

Analyte	Aqueous mg/L			Solid (mg/kg)				
	True	Found	%R	True	Found	C	Limits	%R
Arsenic				146	135		116 176	92
Cadmium				91.9	92.3		74.9 109	100
Chromium				176	186		138 214	106
Copper				70.0	65.8		57.5 82.6	94
Lead				68.1	70.0		54.9 81.3	103
Mercury				1.49	1.75		0.852 2.12	117
Nickel				84.0	80.7		68.5 99.5	96
Selenium				73.0	81.4		55.1 90.8	112
Silver				93.0	98.6		57.0 129	106
Zinc				402	363		319 485	90

00029
00030

Organochlorine Pesticides
EPA Method 8081

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Collected: 10/17/2005
Date Received: 10/28/2005

Organochlorine Pesticides

Sample Name: LRT-S02 Comp
Lab Code: K0505291-002

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3540C
Analysis Method: 8081A

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
beta-BHC	ND	U	1.1	1	11/02/05	11/30/05	KWG0518937	
gamma-BHC (Lindane)	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
delta-BHC	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
Heptachlor	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
Aldrin	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
Heptachlor Epoxide	**1.2**	P	1.0	1	11/02/05	11/30/05	KWG0518937	
gamma-Chlordane†	ND	Ui	1.6	1	11/02/05	11/30/05	KWG0518937	
Endosulfan I	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
alpha-Chlordane	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
Dieldrin	**3.4**		1.0	1	11/02/05	11/30/05	KWG0518937	
4,4'-DDE	**20**	P	1.0	1	11/02/05	11/30/05	KWG0518937	
Endrin	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
Endosulfan II	**3.1**	P	1.0	1	11/02/05	11/30/05	KWG0518937	
4,4'-DDD	**83**	D	10	10	11/02/05	11/30/05	KWG0518937	
Endrin Aldehyde	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
Endosulfan Sulfate	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
4,4'-DDT	**35**		1.0	1	11/02/05	11/30/05	KWG0518937	
Endrin Ketone	**1.4**	P	1.0	1	11/02/05	11/30/05	KWG0518937	
Methoxychlor	ND	U	1.0	1	11/02/05	11/30/05	KWG0518937	
Toxaphene	ND	U	50	1	11/02/05	11/30/05	KWG0518937	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	76	38-125	11/30/05	Acceptable
Decachlorobiphenyl	84	26-166	11/30/05	Acceptable

Analyte Comments

gamma-Chlordane	For this analyte (CAS Registry No. 5103-74-2), USEPA has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

Comments:

00031

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Collected: NA
Date Received: NA

Organochlorine Pesticides

Sample Name: Method Blank
Lab Code: KWG0518937-4

Extraction Method: EPA 3540C
Analysis Method: 8081A

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
alpha-BHC	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
beta-BHC	ND	U	0.48	1	11/02/05	11/29/05	KWG0518937	
gamma-BHC (Lindane)	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
delta-BHC	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Heptachlor	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Aldrin	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Heptachlor Epoxide	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
gamma-Chlordane†	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Endosulfan I	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
alpha-Chlordane	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Dieldrin	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
4,4'-DDE	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Endrin	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Endosulfan II	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
4,4'-DDD	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Endrin Aldehyde	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Endosulfan Sulfate	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
4,4'-DDT	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Endrin Ketone	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Methoxychlor	ND	U	0.45	1	11/02/05	11/29/05	KWG0518937	
Toxaphene	ND	U	23	1	11/02/05	11/29/05	KWG0518937	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tetrachloro-m-xylene	88	38-125	11/29/05	Acceptable
Decachlorobiphenyl	100	26-166	11/29/05	Acceptable

† **Analyte Comments**

gamma-Chlordane	For this analyte (CAS Registry No. 5103-74-2), USEPA has corrected the name to be beta-Chlordane, also known as trans-Chlordane.

Comments:

00032

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B

Surrogate Recovery Summary
Organochlorine Pesticides

Extraction Method: EPA 3540C
Analysis Method: 8081A

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2
LRT-S02 Comp	K0505291-002	76	84
Method Blank	KWG0518937-4	88	100
Batch QC	K0505215-004	68 D	46 D
Batch QCMS	KWG0518937-1	121 D	58 D
Batch QCDMS	KWG0518937-2	57 D	30 D
Lab Control Sample	KWG0518937-3	75	90

Surrogate Recovery Control Limits (%)

Sur1 = Tetrachloro-m-xylene	38-125
Sur2 = Decachlorobiphenyl	26-166

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Extracted: 11/02/2005
Date Analyzed: 11/30/2005

Matrix Spike/Duplicate Matrix Spike Summary
Organochlorine Pesticides

Sample Name: Batch QC
Lab Code: K0505215-004

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3540C
Analysis Method: 8081A

Level: Low
Extraction Lot: KWG0518937

Analyte Name	Sample Result	Batch QCMS KWG0518937-1 Matrix Spike Result	Expected	%Rec	Batch QCDMS KWG0518937-2 Duplicate Matrix Spike Result	Expected	%Rec	%Rec Limits	RPD	RPD Limit
alpha-BHC	ND	5.87	20.0	29 *	9.15	20.0	46	41-148	44	50
beta-BHC	ND	33.5	20.0	168 *	38.9	20.0	195 *	37-152	15	50
gamma-BHC (Lindane)	ND	23.6	20.0	118	23.8	20.0	119	45-153	1	50
delta-BHC	ND	36.7	20.0	184 *	34.0	20.0	170 *	35-162	8	50
Heptachlor	ND	17.1	20.0	86	14.9	20.0	75	35-151	14	50
Aldrin	80	172	20.0	462 #	173	20.0	465 #	39-143	0	50
Heptachlor Epoxide	ND	36.1	20.0	181 *	23.5	20.0	118	37-148	42	50
gamma-Chlordane	ND	42.7	20.0	214 *	44.6	20.0	223 *	33-161	4	50
Endosulfan I	ND	18.0	20.0	90	21.3	20.0	107	10-141	17	50
alpha-Chlordane	ND	33.1	20.0	166 *	29.5	20.0	148 *	40-140	12	50
Dieldrin	ND	25.3	20.0	127	39.4	20.0	197 *	48-142	44	50
4,4'-DDE	ND	13.6	20.0	68	13.2	20.0	66	35-146	3	50
Endrin	ND	7.80	20.0	39 *	8.12	20.0	41 *	44-146	4	50
Endosulfan II	ND	27.6	20.0	138 *	52.0	20.0	260 *	21-135	61 *	50
4,4'-DDD	130	182	20.0	283 #	169	20.0	217 #	32-156	8	50
Endrin Aldehyde	ND	15.2	20.0	76	17.7	20.0	89	18-137	16	50
Endosulfan Sulfate	ND	30.7	20.0	154 *	33.5	20.0	168 *	39-148	8	50
4,4'-DDT	ND	57.4	20.0	287 *	26.3	20.0	132	31-161	74 *	50
Endrin Ketone	72	80.5	20.0	41	75.4	20.0	16 *	37-149	7	50
Methoxychlor	150	143	20.0	-15 #	127	20.0	-95 #	35-158	12	50

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Extracted: 11/02/2005
Date Analyzed: 11/30/2005

Lab Control Spike Summary
Organochlorine Pesticides

Extraction Method: EPA 3540C
Analysis Method: 8081A

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0518937

Analyte Name	Lab Control Sample KWG0518937-3 Lab Control Spike Result	Expected	%Rec	%Rec Limits
alpha-BHC	20.4	20.0	102	67-130
beta-BHC	20.6	20.0	103	66-134
gamma-BHC (Lindane)	20.6	20.0	103	70-125
delta-BHC	22.7	20.0	113	78-139
Heptachlor	20.7	20.0	104	69-120
Aldrin	21.3	20.0	107	67-120
Heptachlor Epoxide	22.2	20.0	111	70-117
gamma-Chlordane	21.8	20.0	109	74-117
Endosulfan I	15.3	20.0	76	50-112
alpha-Chlordane	21.1	20.0	106	72-116
Dieldrin	21.3	20.0	107	74-121
4,4'-DDE	22.4	20.0	112	73-126
Endrin	22.6	20.0	113	76-127
Endosulfan II	17.1	20.0	86	59-116
4,4'-DDD	21.8	20.0	109	74-130
Endrin Aldehyde	20.6	20.0	103	29-138
Endosulfan Sulfate	21.4	20.0	107	70-124
4,4'-DDT	21.4	20.0	107	75-132
Endrin Ketone	21.7	20.0	108	72-123
Methoxychlor	23.8	20.0	119	68-137

Results flagged with an asterisk (*) indicate values outside control criteria.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

00035

Polychlorinated Biphenyls
PCB's
EPA Method 8082

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Collected: 10/17/2005
Date Received: 10/28/2005

Polychlorinated Biphenyls (PCBs)

Sample Name: LRT-S02 Comp
Lab Code: K0505291-002

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3540C
Analysis Method: 8082

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Aroclor 1016	ND	U	10	1	11/02/05	11/16/05	KWG0518938	
Aroclor 1221	ND	U	20	1	11/02/05	11/16/05	KWG0518938	
Aroclor 1232	ND	U	10	1	11/02/05	11/16/05	KWG0518938	
Aroclor 1242	ND	U	10	1	11/02/05	11/16/05	KWG0518938	
Aroclor 1248	ND	U	10	1	11/02/05	11/16/05	KWG0518938	
Aroclor 1254	ND	Ui	31	1	11/02/05	11/16/05	KWG0518938	
Aroclor 1260	ND	U	10	1	11/02/05	11/16/05	KWG0518938	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	81	20-161	11/16/05	Acceptable

Comments:

00037

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Pacific Eco-Risk Laboratories	**Service Request:**	K0505291B
Project:	LRTC	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Polychlorinated Biphenyls (PCBs)

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0518938-4	**Basis:**	Dry
Extraction Method:	EPA 3540C	**Level:**	Low
Analysis Method:	8082		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Aroclor 1016	ND	U	4.5	1	11/02/05	11/15/05	KWG0518938	
Aroclor 1221	ND	U	8.9	1	11/02/05	11/15/05	KWG0518938	
Aroclor 1232	ND	U	4.5	1	11/02/05	11/15/05	KWG0518938	
Aroclor 1242	ND	U	4.5	1	11/02/05	11/15/05	KWG0518938	
Aroclor 1248	ND	U	4.5	1	11/02/05	11/15/05	KWG0518938	
Aroclor 1254	ND	U	4.5	1	11/02/05	11/15/05	KWG0518938	
Aroclor 1260	ND	U	4.5	1	11/02/05	11/15/05	KWG0518938	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Decachlorobiphenyl	100	20-161	11/15/05	Acceptable

Comments:

00038

SuperSet Reference: RR54257

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B

Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)

Extraction Method: EPA 3540C
Analysis Method: 8082

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1
LRT-S02 Comp	K0505291-002	81
Method Blank	KWG0518938-4	100
Batch QC	K0505215-005	88
Batch QCMS	KWG0518938-1	83
Batch QCDMS	KWG0518938-2	93
Lab Control Sample	KWG0518938-3	97

Surrogate Recovery Control Limits (%)

Sur1 = Decachlorobiphenyl	20-161

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

00039

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Extracted: 11/02/2005
Date Analyzed: 11/15/2005 - 11/16/2005

Matrix Spike/Duplicate Matrix Spike Summary
Polychlorinated Biphenyls (PCBs)

Sample Name: Batch QC
Lab Code: K0505215-005

Units: ug/Kg
Basis: Dry

Extraction Method: EPA 3540C
Analysis Method: 8082

Level: Low
Extraction Lot: KWG0518938

Analyte Name	Sample Result	Batch QCMS KWG0518938-1 Matrix Spike Result	Expected	%Rec	Batch QCDMS KWG0518938-2 Duplicate Matrix Spike Result	Expected	%Rec	%Rec Limits	RPD	RPD Limit
Aroclor 1016	ND	231	200	115	242	199	121	33-155	5	50
Aroclor 1260	ND	378	200	189 *	377	199	189 *	36-161	0	50

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

00040

SuperSet Reference: RR54257

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Extracted: 11/02/2005
Date Analyzed: 11/15/2005

Lab Control Spike Summary
Polychlorinated Biphenyls (PCBs)

Extraction Method: EPA 3540C
Analysis Method: 8082

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0518938

	Lab Control Sample KWG0518938-3 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Aroclor 1016	215	200	108	43-141
Aroclor 1260	223	200	112	50-145

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

00041

SuperSet Reference: RR54257

Butyltins

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Collected: 10/17/2005
Date Received: 10/28/2005

Butyltins (as cation)

Sample Name: LRT-S02 Comp
Lab Code: K0505291-002

Extraction Method: METHOD
Analysis Method: Krone

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetra-n-butyltin	ND	U	2.3	1	11/02/05	11/04/05	KWG0518939	
Tri-n-butyltin	**18**		2.3	1	11/02/05	11/04/05	KWG0518939	
Di-n-butyltin	**11**		2.3	1	11/02/05	11/04/05	KWG0518939	
n-Butyltin	ND	U	2.3	1	11/02/05	11/04/05	KWG0518939	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	87	10-127	11/04/05	Acceptable

Comments:

00043

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client:	Pacific Eco-Risk Laboratories	**Service Request:**	K0505291B
Project:	LRTC	**Date Collected:**	NA
Sample Matrix:	Sediment	**Date Received:**	NA

Butyltins (as cation)

Sample Name:	Method Blank	**Units:**	ug/Kg
Lab Code:	KWG0518939-4	**Basis:**	Dry
Extraction Method:	METHOD	**Level:**	Low
Analysis Method:	Krone		

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Tetra-n-butyltin	ND	U	1.0	1	11/02/05	11/04/05	KWG0518939	
Tri-n-butyltin	ND	U	1.0	1	11/02/05	11/04/05	KWG0518939	
Di-n-butyltin	ND	U	1.0	1	11/02/05	11/04/05	KWG0518939	
n-Butyltin	ND	U	1.0	1	11/02/05	11/04/05	KWG0518939	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Tri-n-propyltin	97	10-127	11/04/05	Acceptable

Comments:

00044

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B

Surrogate Recovery Summary
Butyltins (as cation)

Extraction Method: METHOD
Analysis Method: Krone

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1
LRT-S02 Comp	K0505291-002	87
Method Blank	KWG0518939-4	97
Batch QCMS	KWG0518939-1	82
Batch QCDMS	KWG0518939-2	83
Batch QC	L0501982-010	97
Lab Control Sample	KWG0518939-3	83

Surrogate Recovery Control Limits (%)

Sur1 = Tri-n-propyltin	10-127

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Soil

Service Request: K0505291B
Date Extracted: 11/02/2005
Date Analyzed: 11/04/2005

Matrix Spike/Duplicate Matrix Spike Summary
Butyltins (as cation)

Sample Name: Batch QC
Lab Code: L0501982-010

Extraction Method: METHOD
Analysis Method: Krone

Units: ug/Kg
Basis: Dry

Level: Low
Extraction Lot: KWG0518939

Analyte Name	Sample Result	Batch QCMS KWG0518939-1 Matrix Spike Result	Matrix Spike Expected	Matrix Spike %Rec	Batch QCDMS KWG0518939-2 Duplicate Matrix Spike Result	Duplicate Matrix Spike Expected	Duplicate Matrix Spike %Rec	%Rec Limits	RPD	RPD Limit
Tetra-n-butyltin	ND	28.7	29.3	98	26.4	29.2	91	10-132	8	50
Tri-n-butyltin	ND	20.0	26.0	77	21.3	25.9	82	10-140	6	50
Di-n-butyltin	ND	19.5	22.5	87	20.6	22.4	92	10-141	5	50
n-Butyltin	ND	5.16	18.3	28	4.15	18.2	23	10-64	22	50

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

00046

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Extracted: 11/02/2005
Date Analyzed: 11/04/2005

Lab Control Spike Summary
Butyltins (as cation)

Extraction Method: METHOD
Analysis Method: Krone

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0518939

	Lab Control Sample KWG0518939-3 Lab Control Spike			
Analyte Name	**Result**	**Expected**	**%Rec**	**%Rec Limits**
Tetra-n-butyltin	23.2	25.0	93	10-127
Tri-n-butyltin	20.2	22.2	91	13-125
Di-n-butyltin	21.5	19.2	112	14-145
n-Butyltin	12.7	15.6	82	10-96

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

00047

Semi-Volatile Organic Compounds
EPA Method 8270C

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Collected: 10/17/2005
Date Received: 10/28/2005

Polynuclear Aromatic Hydrocarbons

Sample Name: LRT-S02 Comp
Lab Code: K0505291-002

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	5.6	1	11/02/05	11/05/05	KWG0518934	
2-Methylnaphthalene	ND	U	5.6	1	11/02/05	11/05/05	KWG0518934	
Acenaphthylene	ND	U	5.6	1	11/02/05	11/05/05	KWG0518934	
Acenaphthene	ND	U	5.6	1	11/02/05	11/05/05	KWG0518934	
Fluorene	ND	U	5.6	1	11/02/05	11/05/05	KWG0518934	
Dibenzofuran	ND	U	5.6	1	11/02/05	11/05/05	KWG0518934	
Phenanthrene	**6.0**		5.6	1	11/02/05	11/05/05	KWG0518934	
Anthracene	ND	U	5.6	1	11/02/05	11/05/05	KWG0518934	
Fluoranthene	**14**		5.6	1	11/02/05	11/05/05	KWG0518934	
Pyrene	**16**		5.6	1	11/02/05	11/05/05	KWG0518934	
Benz(a)anthracene	**8.1**		5.6	1	11/02/05	11/05/05	KWG0518934	
Chrysene	**12**		5.6	1	11/02/05	11/05/05	KWG0518934	
Benzo(b)fluoranthene	**12**		5.6	1	11/02/05	11/05/05	KWG0518934	
Benzo(k)fluoranthene	**9.3**		5.6	1	11/02/05	11/05/05	KWG0518934	
Benzo(a)pyrene	**11**		5.6	1	11/02/05	11/05/05	KWG0518934	
Indeno(1,2,3-cd)pyrene	**10**		5.6	1	11/02/05	11/05/05	KWG0518934	
Dibenz(a,h)anthracene	ND	U	5.6	1	11/02/05	11/05/05	KWG0518934	
Benzo(g,h,i)perylene	**12**		5.6	1	11/02/05	11/05/05	KWG0518934	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	80	10-122	11/05/05	Acceptable
Fluoranthene-d10	95	10-129	11/05/05	Acceptable
Terphenyl-d14	72	32-134	11/05/05	Acceptable

Comments:

00049

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Results

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Collected: NA
Date Received: NA

Polynuclear Aromatic Hydrocarbons

Sample Name: Method Blank
Lab Code: KWG0518934-5

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low

Analyte Name	Result	Q	MRL	Dilution Factor	Date Extracted	Date Analyzed	Extraction Lot	Note
Naphthalene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
2-Methylnaphthalene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Acenaphthylene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Acenaphthene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Fluorene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Dibenzofuran	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Phenanthrene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Anthracene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Fluoranthene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Pyrene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Benz(a)anthracene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Chrysene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Benzo(b)fluoranthene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Benzo(k)fluoranthene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Benzo(a)pyrene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Indeno(1,2,3-cd)pyrene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Dibenz(a,h)anthracene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	
Benzo(g,h,i)perylene	ND	U	2.5	1	11/02/05	11/05/05	KWG0518934	

Surrogate Name	%Rec	Control Limits	Date Analyzed	Note
Fluorene-d10	27	10-122	11/05/05	Acceptable
Fluoranthene-d10	70	10-129	11/05/05	Acceptable
Terphenyl-d14	74	32-134	11/05/05	Acceptable

Comments:

00050

SuperSet Reference: RR53966

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B

Surrogate Recovery Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: PERCENT
Level: Low

Sample Name	Lab Code	Sur1	Sur2	Sur3
LRT-S02 Comp	K0505291-002	80	95	72
Method Blank	KWG0518934-5	27	70	74
LRT-S02 CompMS	KWG0518934-1	40	48	51
LRT-S02 CompDMS	KWG0518934-2	32	38	46
Lab Control Sample	KWG0518934-3	63	79	82
Duplicate Lab Control Sample	KWG0518934-4	43	74	65

Surrogate Recovery Control Limits (%)

Sur1 = Fluorene-d10	10-122
Sur2 = Fluoranthene-d10	10-129
Sur3 = Terphenyl-d14	32-134

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.

00051

SuperSet Reference: RR53966

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Extracted: 11/02/2005
Date Analyzed: 11/05/2005

Matrix Spike/Duplicate Matrix Spike Summary
Polynuclear Aromatic Hydrocarbons

Sample Name: LRT-S02 Comp
Lab Code: K0505291-002

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry

Level: Low
Extraction Lot: KWG0518934

Analyte Name	Sample Result	LRT-S02 CompMS KWG0518934-1 Matrix Spike			LRT-S02 CompDMS KWG0518934-2 Duplicate Matrix Spike			%Rec Limits	RPD	RPD Limit
		Result	Expected	%Rec	Result	Expected	%Rec			
Naphthalene	ND	267	558	48	247	558	44	22-101	8	40
2-Methylnaphthalene	ND	232	558	42	199	558	36	27-106	15	40
Acenaphthylene	ND	312	558	56	250	558	45	36-113	22	40
Acenaphthene	ND	282	558	50	219	558	39	32-114	25	40
Fluorene	ND	288	558	52	218	558	39	39-118	28	40
Dibenzofuran	ND	287	558	51	222	558	40	33-110	26	40
Phenanthrene	6.0	311	558	55	259	558	45	29-130	18	40
Anthracene	ND	327	558	59	265	558	48	38-133	21	40
Fluoranthene	14	370	558	64	292	558	50	30-143	24	40
Pyrene	16	448	558	77	364	558	62	28-143	21	40
Benz(a)anthracene	8.1	325	558	57	236	558	41	24-149	32	40
Chrysene	12	426	558	74	315	558	55	38-133	30	40
Benzo(b)fluoranthene	12	328	558	57	252	558	43	26-144	26	40
Benzo(k)fluoranthene	9.3	332	558	58	237	558	41	29-136	34	40
Benzo(a)pyrene	11	358	558	62	264	558	45	30-146	30	40
Indeno(1,2,3-cd)pyrene	10	290	558	50	215	558	37	24-147	30	40
Dibenz(a,h)anthracene	ND	267	558	48	204	558	37	33-136	26	40
Benzo(g,h,i)perylene	12	325	558	56	235	558	40	23-142	32	40

Results flagged with an asterisk (*) indicate values outside control criteria.
Results flagged with a pound (#) indicate the control criteria is not applicable.
Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

00052

SuperSet Reference: RR52066

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Pacific Eco-Risk Laboratories
Project: LRTC
Sample Matrix: Sediment

Service Request: K0505291B
Date Extracted: 11/02/2005
Date Analyzed: 11/05/2005

Lab Control Spike/Duplicate Lab Control Spike Summary
Polynuclear Aromatic Hydrocarbons

Extraction Method: EPA 3541
Analysis Method: 8270C SIM

Units: ug/Kg
Basis: Dry
Level: Low
Extraction Lot: KWG0518934

	Lab Control Sample KWG0518934-3 Lab Control Spike			Duplicate Lab Control Sample KWG0518934-4 Duplicate Lab Control Spike					
Analyte Name	**Result**	**Expected**	**%Rec**	**Result**	**Expected**	**%Rec**	**%Rec Limits**	**RPD**	**RPD Limit**
Naphthalene	417	500	83	374	500	75	43-102	11	40
2-Methylnaphthalene	376	500	75	300	500	60	44-105	22	40
Acenaphthylene	443	500	89	409	500	82	51-107	8	40
Acenaphthene	427	500	85	392	500	78	50-105	8	40
Fluorene	433	500	87	395	500	79	54-108	9	40
Dibenzofuran	437	500	87	397	500	79	50-106	10	40
Phenanthrene	432	500	86	408	500	82	58-106	6	40
Anthracene	432	500	86	414	500	83	61-113	4	40
Fluoranthene	455	500	91	436	500	87	63-117	4	40
Pyrene	477	500	95	461	500	92	59-121	3	40
Benz(a)anthracene	409	500	82	390	500	78	57-120	5	40
Chrysene	430	500	86	411	500	82	64-116	4	40
Benzo(b)fluoranthene	428	500	86	395	500	79	58-126	8	40
Benzo(k)fluoranthene	409	500	82	376	500	75	61-122	8	40
Benzo(a)pyrene	430	500	86	402	500	80	58-128	7	40
Indeno(1,2,3-cd)pyrene	400	500	80	389	500	78	46-133	3	40
Dibenz(a,h)anthracene	426	500	85	413	500	83	50-128	3	40
Benzo(g,h,i)perylene	432	500	86	408	500	82	52-125	6	40

Results flagged with an asterisk (*) indicate values outside control criteria.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

00053

Appendix C

Ammonia and Sulfide Analyses Performed in Support of Bioassay Testing

Table C-1. Sediment porewater water ammonia levels for *Ampelisca* bioassays tests at test initiation

Sample ID	pH	Salinity (ppt)	Total Ammonia (mg/L N)
"Home" Lab Control	7.36	27.5	13.3
San Pablo (SF-10)	7.63	30.1	<1.0
Alcatraz (SF-11)	7.59	30.8	<1.0
LRT-SO2 COMP	7.61	30.5	8.8

Table C-2. Sediment porewater water ammonia levels for *Ampelisca* bioassays tests at test termination

Sample ID	pH	Salinity (ppt)	Total Ammonia (mg/L N)
"Home" Lab Control	NM	NM	NM
San Pablo (SF-10)	7.51	31.6	<1.0
Alcatraz (SF-11)	7.48	30.9	<1.0
LRT-SO2 COMP	7.26	30.3	<1.0

NM = not measured

Table C-3. Sediment overlying water total ammonia levels for *Ampelisca* bioassays tests.

Sample ID	Total Ammonia (mg/L N)	
	Test Initiation	Test Termination
"Home" Lab Control	1.0	<1.0
San Pablo (SF-10)	<1.0	<1.0
Alcatraz (SF-11)	<1.0	<1.0
LRT-SO2 COMP	1.0	<1.0

Table C-4. Sediment porewater water ammonia levels for *Neanthes* bioassays tests at test initiation

Sample ID	pH	Salinity (ppt)	Total Ammonia (mg/L N)
Lab Control	7.65	29.1	2.23
San Pablo (SF-10)	7.70	29.9	<1.0
Alcatraz (SF-11)	7.62	29.8	<1.0
LRT-SO2 COMP	7.65	29.0	12.8

Table C-5. Sediment porewater water ammonia levels for *Neanthes* bioassays tests at test termination

Sample ID	pH	Salinity (ppt)	Total Ammonia (mg/L N)
Lab Control	7.48	30.8	<1.0
San Pablo (SF-10)	7.68	30.7	<1.0
Alcatraz (SF-11)	7.80	30.4	<1.0
LRT-SO2 COMP	7.65	30.7	1.1

Table C-6. Sediment overlying water total ammonia levels for *Neanthes* bioassays tests.

Sample ID	Total Ammonia (mg/L N)	
	Test Initiation	Test Termination
"Home" Lab Control	<1.0	<1.0
San Pablo (SF-10)	<1.0	<1.0
Alcatraz (SF-11)	<1.0	<1.0
LRT-SO2 COMP	<1.0	<1.0

Appendix D

Test Data and Summary of Statistics for the Toxicity Evaluation of Levin Richmond Sediments with the Amphipod, *Ampelisca abdita*

CETIS Test Summary

Report Date: 23 Dec-05 9:58 AM
Test Link: 00-8122-5362/15583

Acute Amphipod Survival Test — **Pacific EcoRisk**

Test No:	03-1403-2541	**Test Type:**	Survival	**Duration:**	9d 15h
Start Date:	30 Oct-05 05:15 PM	**Protocol:**	ASTM E1367-99 (1999)	**Species:**	Ampelisca abdita
Ending Date:	09 Nov-05 08:30 AM	**Dil Water:**	Not Applicable	**Source:**	Brezina and Associates
Setup Date:	30 Oct-05 05:15 PM	**Brine:**	Not Applicable		

Sample No:	09-1485-8133	**Material:**	Marine Sediment	**Client:**	LRTC
Sample Date:	17 Oct-05	**Code:**	10649	**Project:**	
Receive Date:	17 Oct-05 04:21 PM	**Source:**	LRTC		
Sample Age:	13d 17h (7.9 °C)	**Station:**	LRT-SO2 COMP		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
04-1129-2055	Proportion Survived	< 100	100	N/A	4.11%	Equal Variance t Two-Sample

Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Alcatraz	5	0.77000	0.70000	0.85000	0.02550	0.05701	7.40%
0	Control Sed	5	0.94000	0.90000	1.00000	0.01871	0.04183	4.45%
0	Silica Sand Co	5	0.67000	0.60000	0.75000	0.03000	0.06708	10.01%
0	San Pablo	5	0.78000	0.65000	1.00000	0.06633	0.14832	19.02%
100		5	0.83000	0.80000	0.85000	0.01225	0.02739	3.30%

Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Alcatraz	0.70000	0.75000	0.80000	0.75000	0.85000
0	Control Sed	1.00000	0.95000	0.95000	0.90000	0.90000
0	Silica Sand Co	0.75000	0.60000	0.70000	0.70000	0.60000
0	San Pablo	0.75000	1.00000	0.65000	0.85000	0.65000
100		0.85000	0.85000	0.85000	0.80000	0.80000

Analyst:_____ Approval: WD

CETIS Analysis Detail

Acute Amphipod Survival Test — **Pacific EcoRisk**

Test No:	03-1403-2541	**Test Type:**	Survival	**Duration:**	9d 15h
Start Date:	30 Oct-05 05:15 PM	**Protocol:**	ASTM E1367-99 (1999)	**Species:**	Ampelisca abdita
Ending Date:	09 Nov-05 08:30 AM	**Dil Water:**	Not Applicable	**Source:**	Brezina and Associates
Setup Date:	30 Oct-05 05:15 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	00-8122-5362	01-7078-0746	13 Dec-05 12:10 PM	CETISv1.1.1

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	4.11%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.77731	23.15450	0.11778	Equal Variances
Distribution	Shapiro-Wilk W	0.89264		0.18154	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0835081	0.0835081	1	18.89	0.00246	Significant Effect
Error	0.0353708	0.0044213	8			
Total	0.11887891	0.0879295	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Control Sed		100	4.34597	1.85955	0.0012	0.07820	Significant Effect

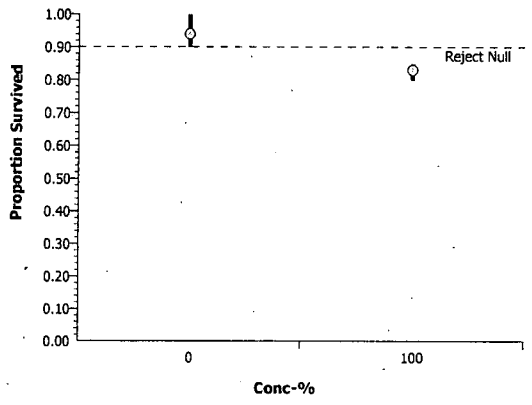
Data Summary

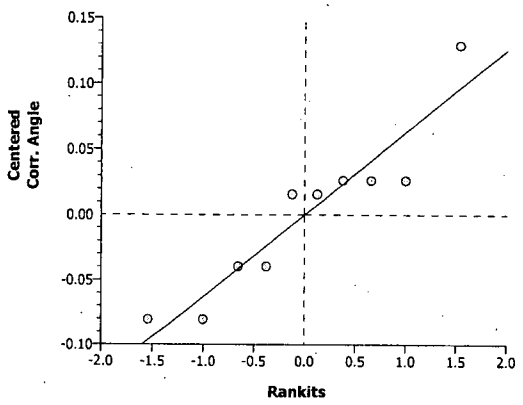
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	5	0.94000	0.90000	1.00000	0.04183	1.32948	1.24905	1.45876	0.08682
100		5	0.83000	0.80000	0.85000	0.02739	1.14672	1.10715	1.17310	0.03612

Data Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Control Sed	1.00000	0.95000	0.95000	0.90000	0.90000					
100		0.85000	0.85000	0.85000	0.80000	0.80000					

Graphics





Analyst:_____ Approval:_____

10-Day Estuarine/Marine Sediment Toxicity Test Data

Client: LRTC Test ID#: 15583 Date (Day 0): 10/30/05

Species: *Ampelisca abdita* Organism Log#: 2497 Organism Supplier: Brezina

Day of Test	Test Replicate	Sample ID: 502 Temp (°C)	pH	D.O. (mg/L)	Salinity (ppt)	# Alive	Sign-Off
Day 0	Rep A	19.9	7.92	6.94	30.2	~~10~~ 20	Date: 10/30/05 Time: 1715 WQ: JS Scientist: W DB MA
	Rep B	19.9	7.92	7.08	29.3	20	
	Rep C	19.8	7.92	7.01	29.7	20	
	Rep D	19.7	7.92	7.05	30.1	20	
	Rep E	19.7	7.94	7.05	29.5	20	
Day 1	Rep A	20.2	7.90	7.8	31.0		Date: 10.31.05 Time: 1430 WQ: JE
Day 2	Rep B	20.1	7.82	7.1	30.5		Date: 11/1/05 Time: 10:55 WQ: RP
Day 3	Rep C	20.4	8.03	7.1	31.2		Date: 11-2-05 Time: 1530 WQ: JE
Day 4	Rep D	20.4	8.04	7.0	31.3		Date: 11-3-05 Time: 11:50 WQ: DH
Day 5	Rep E	20.2	8.07	6.2	31.7		Date: 11/4/05 Time: 14:30 WQ: RP
Day 6	Rep A	20.4	7.61	6.2	31.1		Date: 11/5/5 Time: 9:55 WQ: RP
Day 7	Rep B	20.5	8.27	7.1	30.1		Date: 11.6.05 Time: 1000 WQ: CS
Day 8	Rep C	20.1	8.15	7.0	30.2		Date: 11-7-05 Time: 12:30 WQ: VK
Day 9	Rep D	20.5	8.35	7.0	31.5		Date: 11-8-05 Time: 15:00 WQ: VK
Day 10	Rep A	20.1	8.44	7.4	31.6	17	Date: 11-9-05 Time: 0830 WQ: JE Scientist: MM
	Rep B	20.0	8.45	7.6	31.4	17	
	Rep C	20.0	8.50	7.7	31.3	17	
	Rep D	20.0	8.45	7.8	31.5	16	
	Rep E	20.1	8.67	7.8	31.8	16	

Day of Test	Matrix	pH	D.O. (mg/L)	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L)	Sign-Off
Day 0	Porewater	7.61	5.6	30.5	0.034	8.8	Date: 10/30/05 Time: 1700 WQ: DG
	Overlying Water					1.0	Date: 11-9-05 Time: 0830 WQ: JE AG 11-2-05
Day 10	Porewater	7.86	6.5	30.9	0.019	<1.0	Date: 11-9-05 Time: 0830 WQ: JE
	Overlying Water					<1.0	Date: 11-9-05 Time: 0830 WQ: JE

10-Day Estuarine/Marine Sediment Toxicity Test Data

Client: LRTC Test ID#: 15580/15583 Date (Day 0): 10/30/05

Species: *Ampelisca abdita* Organism Log#: 2497 Organism Supplier: Brezina

Day of Test	Test Replicate	Sample ID: Control #2 Temp (°C)	pH	D.O. (mg/L)	Salinity (ppt)	# Alive	Sign-Off
Day 0	Rep A	19.9	7.8	6.93	29.8	~~10~~ 20	Date: 10/30/05 Time: 1715 WQ: JS Scientist: W DB ~~DB~~ MM
	Rep B	19.8	7.78	7.04	29.8	20	
	Rep C	19.8	7.80	7.06	29.8	20	
	Rep D	19.8	7.81	7.02	29.8	20	
	Rep E	19.8	7.83	7.01	29.9	20	
Day 1	Rep A	20.2	7.75	7.1	30.5		Date: 10.31-05 Time: 1430 WQ: MC
Day 2	Rep B	20.1	7.64	5.9	30.3		Date: 11/1/05 Time: 10.55 WQ: RP
Day 3	Rep C	20.4	7.86	6.8	30.6		Date: 11-2-05 Time: 1530 WQ: MC
Day 4	Rep D	20.4	7.59	6.3	30.7		Date: 11-3-05 Time: 1150 WQ: DH
Day 5	Rep E	20.2	8.04	7.4	30.7		Date: 11 Time: 14:30 WQ: RP
Day 6	Rep A	20.6	7.94	7.0	30.9		Date: 11/5/05 Time: 9:55 WQ: RP
Day 7	Rep B	20.5	8.10	7.1	30.7		Date: 11-6-05 Time: 1000 WQ: CS
Day 8	Rep C	20.1	7.96	6.8	30.4		Date: 11-7-05 Time: 12:30 WQ: YK
Day 9	Rep D	20.5	8.07	7.2	31.4		Date: 11-8-05 Time: 15:00 WQ: YK
Day 10	Rep A	20.1	8.28	7.4	30.7	20	Date: 11-9-05 Time: 0830 WQ: MC Scientist: MM
	Rep B	20.1	8.20	7.5	31.8	19	
	Rep C	20.1	8.20	7.6	31.3	19	
	Rep D	20.1	8.20	7.8	31.5	18	
	Rep E	20.1	8.18	7.7	31.8	18	

Day of Test	Matrix	pH	D.O. (mg/L)	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L)	Sign-Off
Day 0	Porewater	7.36	3.7	27.5	0.034	13.3	Date: 10/30/05 Time: 1700 WQ: DB
	Overlying Water					1.0	Date: 11-9-05 Time: 0830 WQ: MC 11-2-05
Day 10	Porewater	NM	NM	NM	NM	NM	Date: 11/9/05 Time: 830 WQ: JS
	Overlying Water					<1.0	Date: 11-9-05 Time: 0830 WQ: MC

10-Day Estuarine/Marine Sediment Toxicity Test Data

Client: LRTC Test ID#: 15580/15583 Date (Day 0): 10/30/05

Species: *Ampelisca abdita* Organism Log#: 2497 Organism Supplier: Brezina

Day of Test	Test Replicate	Sample ID: San Pablo					Sign-Off
		Temp (°C)	pH	D.O. (mg/L)	Salinity (ppt)	# Alive	
Day 0	Rep A	19.9	7.9	7.32	30.3	~~10~~ 20	Date: 10/30/05 Time: 1715 WQ: JS Scientist: ~~RW~~ DB MM
	Rep B	19.7	7.91	7.23	29.9	20	
	Rep C	19.7	7.91	7.20	30.6	20	
	Rep D	19.7	7.92	7.18	29.9	20	
	Rep E	19.7	7.91	7.11	30.3	20	
Day 1	Rep A	20.1	7.85	7.9	31.3		Date: 10-31-05 Time: 1430 WQ: ME
Day 2	Rep B	20.1	7.86	7.2	30.9		Date: ~~11-1-05~~ 11/1/5 Time: 10:55 WQ: RP
Day 3	Rep C	20.4	7.96	7.0	31.2		Date: 11-2-05 Time: 1530 WQ: ME
Day 4	Rep D	20.4	8.04	7.34	31.8		Date: 11-3-05 Time: 11:57 WQ: DB
Day 5	Rep E	20.2	8.00	7.6	31.6		Date: 11/4/5 Time: 14:38 WQ: RP
Day 6	Rep A	20.6	7.86	7.2	30.8		Date: 11/5/5 Time: 9:55 WQ: RP
Day 7	Rep B	20.5	8.02	7.2	30.2		Date: 11-6-05 Time: 1000 WQ: CS
Day 8	Rep C	20.1	8.12	6.9	30.9		Date: 11-7-05 Time: 12:30 WQ: ME
Day 9	Rep D	20.5	8.17	6.8	31.3		Date: 11-8-05 Time: 15:00 WQ: ME
Day 10	Rep A	20.1	8.12	7.5	31.3	15	Date: 11-9-05 Time: 0830 WQ: ME Scientist: MM
	Rep B	20.1	8.11	7.7	31.5	20	
	Rep C	20.1	8.12	8.0	31.7	13	
	Rep D	20.1	8.14	7.8	31.6	17	
	Rep E	20.1	8.17	7.8	31.8	13	

Day of Test	Matrix	pH	D.O. (mg/L)	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L)	Sign-Off
Day 0	Porewater	7.63	6.2	30.1	0.256	<1.0	Date: 10/30/05 Time: 1700 WQ: JS
	Overlying Water					<1.0	Date: 11-9-05 Time: 0830 WQ: ME AG 11-2-05
Day 10	Porewater	7.51	6.7	31.6	0.158	<1.0	Date: 11-9-05 Time: 0830 WQ: ME
	Overlying Water					<1.0	Date: 11-9-05 Time: 0830 WQ: ME

10-Day Estuarine/Marine Sediment Toxicity Test Data

Client: LRTC Test ID#: 15580/15583 Date (Day 0): 10/30/05

Species: *Ampelisca abdita* Organism Log#: 2497 Organism Supplier: Brezina

Day of Test	Test Replicate	Sample ID: Alcatraz					Sign-Off
		Temp (°C)	pH	D.O. (mg/L)	Salinity (ppt)	# Alive	
Day 0	Rep A	19.7	7.91	7.19	29.4	~~10~~ 20	Date: 10/30/05
	Rep B	19.7	7.91	7.21	30.5	20	Time: 1715
	Rep C	19.6	7.92	7.28	30.6	20	WQ: JS
	Rep D	19.6	7.92	7.26	30.7	20	Scientist: ~~JE~~ W DB MM
	Rep E	19.6	7.93	7.18	30.6	20	
Day 1	Rep A	20.0	7.87	7.9	30.9		Date: 10-31-05 Time: 1430 WQ: MC
Day 2	Rep B	20.1	7.94	7.3	31.0		Date: 11/1/05 Time: WQ: RP 10:55
Day 3	Rep C	20.4	7.98	7.0	31.5		Date: 11-2-05 Time: 1530 WQ: MC
Day 4	Rep D	20.4	7.98	7.18	30.7		Date: 11-3-05 Time: 12:00 WQ: DH
Day 5	Rep E	20.2	8.02	7.1	30.8		Date: 11/4/05 Time: WQ: RP 14:30
Day 6	Rep A	20.6	7.91	7.3	31.3		Date: 11/5/05 Time: WQ: RP 9:55
Day 7	Rep B	20.5	8.02	6.9	30.1		Date: 11-6-05 Time: 1000 WQ: CS
Day 8	Rep C	20.1	8.06	6.8	30.7		Date: 11-7-05 Time: WQ: MC 12:30
Day 9	Rep D	20.5	8.09	7.0	31.0		Date: 11-8-05 Time: WQ: MC 15:00
Day 10	Rep A	20.0	8.18	7.4	31.5	14	Date: 11-9-05
	Rep B	20.0	8.11	7.5	31.8	15	Time: 0830
	Rep C	20.0	8.15	7.5	31.6	16	WQ: MC
	Rep D	20.0	8.15	7.7	31.4	15	Scientist: SS
	Rep E	20.1	8.15	7.7	31.7	17	

Day of Test	Matrix	pH	D.O. (mg/L)	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L)	Sign-Off
Day 0	Porewater	7.59	6.9	30.8	0.134	<1.0	Date: 10/30/05 Time: 1700 WQ: JE
	Overlying Water					<1.0	Date: ~~11-4-05~~ 11-2-05 Time: 0830 WQ: ~~MC~~ AS
Day 10	Porewater	7.48	6.4	30.9	0.07	<1.0	Date: 11-9-05 Time: 0830 WQ: MC
	Overlying Water					<1.0	Date: 11-9-05 Time: 0830 WQ: MC

Appendix E

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Amphipod, *Ampelisca abdita*

CETIS Test Summary

Report Date: 09 Nov-05 3:10 PM
Test Link: 10-6194-8004/15586

Acute Amphipod Survival Test — **Pacific EcoRisk**

Test No:	15-6472-3769	**Test Type:**	Survival	**Duration:**	95h
Start Date:	30 Oct-05 05:15 PM	**Protocol:**	ASTM E1367-99 (Amphipod)	**Species:**	Ampelisca abdita
Ending Date:	03 Nov-05 04:15 PM	**Dil Water:**	Seawater	**Source:**	Brezina and Associates
Setup Date:	30 Oct-05 05:15 PM	**Brine:**	Not Applicable		

Sample No:	05-5733-1450	**Material:**	Cadmium chloride	**Client:**	
Sample Date:	30 Oct-05	**Code:**	10651	**Project:**	
Receive Date:	30 Oct-05	**Source:**	Reference Toxicant		
Sample Age:	17h	**Station:**	In House		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-7542-7707	Proportion Survived	0.5	1	0.7071	N/A	Fisher Exact

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-mg/L	95% LCL	95% UCL	Method
12-4775-9765	Proportion Survived	15	0.5351631	0.1383659	0.7518791	Linear Regression
		20	0.5816808	0.1746725	0.7982585	
		25	0.6247982	0.2128937	0.8420225	
		40	0.7481581	0.3457628	0.976491	
		50	0.8338125	0.4552051	1.085544	

Proportion Survived Summary

Conc-mg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	2	0.85000	0.80000	0.90000	0.05000	0.07071	8.32%
0.125		2	0.70000	0.70000	0.70000	0.00000	0.00000	0.00%
0.25		2	0.70000	0.70000	0.70000	0.00000	0.00000	0.00%
0.5		2	0.60000	0.60000	0.60000	0.00000	0.00000	0.00%
1		2	0.30000	0.30000	0.30000	0.00000	0.00000	0.00%
2		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
4		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Proportion Survived Detail

Conc-mg/L	Control Type	Rep 1	Rep 2
0	Lab Water	0.80000	0.90000
0.125		0.70000	0.70000
0.25		0.70000	0.70000
0.5		0.60000	0.60000
1		0.30000	0.30000
2		0.00000	0.00000
4		0.00000	0.00000

CETIS Analysis Detail

Acute Amphipod Survival Test — **Pacific EcoRisk**

Test No:	15-6472-3769	**Test Type:**	Survival	**Duration:**	95h
Start Date:	30 Oct-05 05:15 PM	**Protocol:**	ASTM E1367-99 (Amphipod)	**Species:**	Ampelisca abdita
Ending Date:	03 Nov-05 04:15 PM	**Dil Water:**	Seawater	**Source:**	Brezina and Associates
Setup Date:	30 Oct-05 05:15 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	10-6194-8004	10-6194-8004	09 Nov-05 3:09 PM	CETISv1.1.1

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Fisher Exact	C > T	Untransformed		0.5	1	200	0.7071	

Group Comparisons

Control	vs	Conc-mg/L	Statistic	P-Value	Decision(0.05)
Lab Water		0.125	0.22529	0.22529	Non-Significant Effect
Lab Water		0.25	0.22529	0.22529	Non-Significant Effect
Lab Water		0.5	0.07759	0.07759	Non-Significant Effect
Lab Water		1	0.00053	0.00053	Significant Effect
Lab Water		2	0.00000	0.00000	Significant Effect
Lab Water		4	0.00000	0.00000	Significant Effect

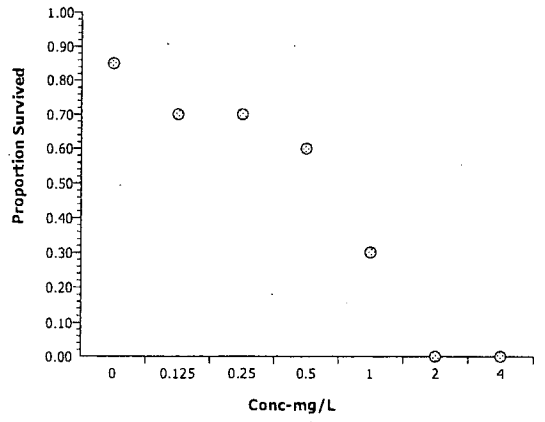
Data Summary

Conc-mg/L	Control Type	Non-Responders	Responders	Total Observed
0	Lab Water	17	3	20
0.125		14	6	20
0.25		14	6	20
0.5		12	8	20
1		6	14	20
2		0	20	20
4		0	20	20

Data Detail

Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	0.80000	0.90000								
0.125		0.70000	0.70000								
0.25		0.70000	0.70000								
0.5		0.60000	0.60000								
1		0.30000	0.30000								
2		0.00000	0.00000								
4		0.00000	0.00000								

Graphics



CETIS Analysis Detail

Acute Amphipod Survival Test — **Pacific EcoRisk**

Test No:	15-6472-3769	**Test Type:**	Survival	**Duration:**	95h
Start Date:	30 Oct-05 05:15 PM	**Protocol:**	ASTM E1367-99 (Amphipod)	**Species:**	Ampelisca abdita
Ending Date:	03 Nov-05 04:15 PM	**Dil Water:**	Seawater	**Source:**	Brezina and Associates
Setup Date:	30 Oct-05 05:15 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Linear Regression	10-6194-8004	10-6194-8004	09 Nov-05 3:09 PM	CETISv1.1.1

Linear Regression Options

Model	Threshold Option	Lower Threshold	Threshold Optimized	Reweighted	Pooled Groups	Het Corr
Log-Normal	Control Threshold	0.15	Yes	Yes	No	No

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P-Value	Decision(0.05)
Threshold	0.258613	0.05639305	0.1480827	0.3691434	4.586	0.01014	Significant
Slope	5.38177	1.802217	1.849425	8.914116	2.986	0.04049	Significant
Intercept	5.424792	0.3151357	4.807126	6.042458	17.214	0.00007	Significant

Regression Summary

Iters	Log Likelihood	μ	σ	γ	χ2	Critical	P-Value	Decision(0.05)
16	-33.93898	1.00799	0.18581	0.43080	1.20396	18.30704	0.99960	Non-Significant Heterogeneity

Residual Analysis

Attribute	Method	Statistic	Critical	P-Value	Decision(0.05)
Variances	Modified Levene	65535	4.95029	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.5945246		0.00010	Non-normal Distribution

Point Estimates

% Effect	Conc-mg/L	95% LCL	95% UCL
15	0.5351631	0.1383659	0.7518791
20	0.5816808	0.1746725	0.7982585
25	0.6247982	0.2128937	0.8420225
40	0.7481581	0.3457628	0.976491
50	0.8338125	0.4552051	1.085544

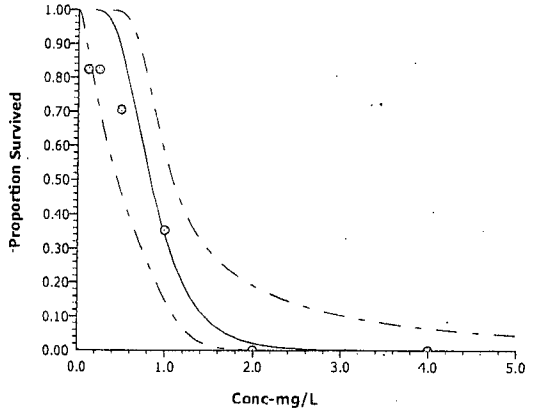
Data Summary

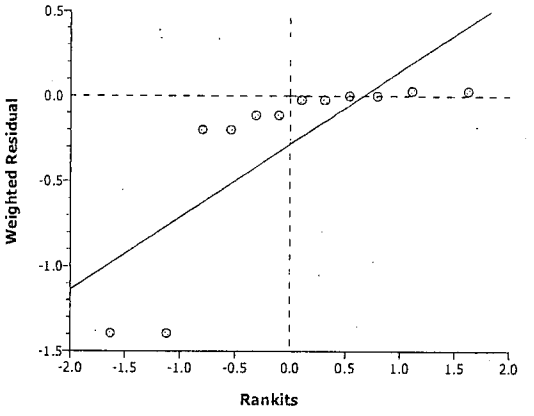
			Calculated Variate(A/B)						
Conc-mg/	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Water	2	0.85000	0.80000	0.90000	0.01443	0.07071	17	20
0.125		2	0.70000	0.70000	0.70000	0.00002	0.00008	14	20
0.25		2	0.70000	0.70000	0.70000	0.00002	0.00008	14	20
0.5		2	0.60000	0.60000	0.60000	0.00003	0.00017	12	20
1		2	0.30000	0.30000	0.30000	0.00002	0.00008	6	20
2		2	0.00000	0.00000	0.00000	0.00000	0.00000	0	20
4		2	0.00000	0.00000	0.00000	0.00000	0.00000	0	20

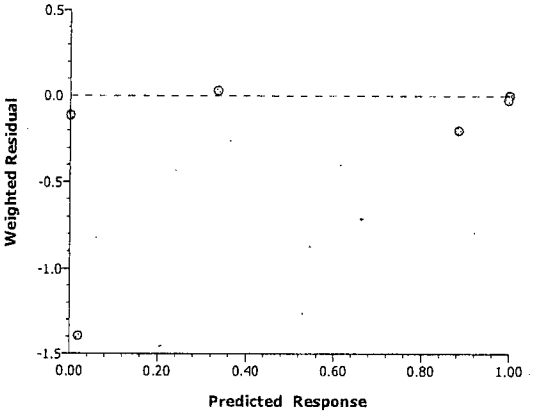
CETIS Analysis Detail

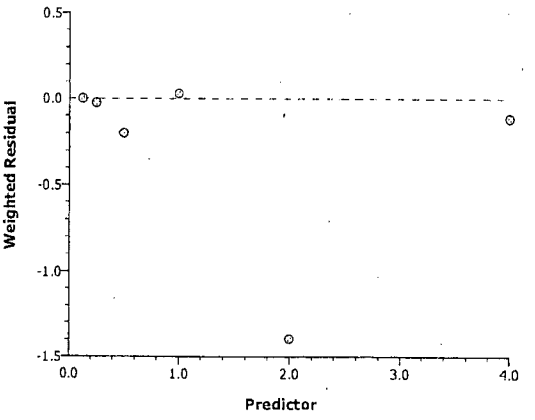
Report Date: 09 Nov-05 3:10 PM
Analysis: 12-4775-9765/15586

Graphics









96 Hour Marine Amphipod Reference Toxicant Test Data

Client: PER Test Date: 10/30/05 Test ID#: 15586

Species: *Ampelisca* Organism Log #: 2497 Test Material: $CdCl_2$

Treatment (mgCd/L)	Temp	pH	DO	Salinity	# Live Animals A	# Live Animals B	Sign-off
Control	19.6	7.83	9.1	27.5	10	10	Time: 1715
0.125	19.6	7.82	8.9	28.0	10	10	
0.25	19.6	7.82	8.9	27.9	10	10	Date: 10-30-5
0.5	19.6	7.82	8.9	27.8	10	10	Name: cmm
1	19.6	7.82	9.0	27.7	10	10	MM
2	19.6	7.82	9.0	27.8	10	10	
4	19.6	7.82	8.9	27.6	10	10	
Control	19.8	7.84	6.2	28.3	10	10	Time: 1200
0.125	19.8	7.83	6.3	28.3	7	9	
0.25	19.8	7.82	6.4	28.4	10	10	Date: 10/31/05
0.5	19.8	7.81	6.3	28.6	10	9	
1	19.8	7.81	6.3	28.4	10	10	
2	19.8	7.80	6.3	28.5	9	9	Name: QD
4	19.8	7.80	6.4	28.4	8	9	QD (then)
Control	19.7	7.47	7.1	28.0	10	10	Time: 1100
0.125	19.7	7.65	7.1	28.0	7	9	
0.25	19.7	7.78	7.0	28.0	10	10	Date: 11/1/05
0.5	19.7	7.78	7.1	28.2	10	8	
1	19.7	7.79	7.1	28.0	7	8	
2	19.7	7.74	6.9	27.9	5	5	Name: QD RP
4	19.7	7.76	6.9	28.0	1	0	
Control	19.8	7.97	7.2	27.6	8	9	Time: 1500
0.125	19.8	7.86	7.1	28.0	7	7	
0.25	19.8	7.87	6.8	28.0	9	9	Date: 11/2/05
0.5	19.8	7.88	6.5	28.0	8	6	Name: QD
1	19.8	7.87	6.9	28.0	6	5	YK
2	19.8	7.85	6.4	27.9	0	0	
4	19.8	7.87	6.9	27.9	0	0	
Control	20.1	7.82	7.1	28.9	8	9	Time: 1615
0.125	20.1	7.86	7.1	28.8	7	7	
0.25	20.1	7.87	7.1	28.3	7	7	Date: 11/3/05
0.5	20.1	7.86	7.1	28.4	6	6	
1	20.1	7.86	7.1	28.4	3	3	RT
2	20.1	7.87	7.1	28.4	—	—	Name:
4	20.1	7.89	7.2	28.2	—	—	MM

Appendix F

Test Data and Summary of Statistics for the Toxicity Evaluation of Levin Richmond Sediments with the Polychaete, *Neanthes arenaceodentata*

CETIS Test Summary

Report Date: 29 Nov-05 10:23 AM
Test Link: 01-9278-7685/15584

Acute Polychaete Survival Test — **Pacific EcoRisk**

Test No:	09-8221-3566	**Test Type:**	Survival	**Duration:**	9d 17h
Start Date:	02 Nov-05 02:55 PM	**Protocol:**	ASTM E1192-97 (1997)	**Species:**	Neanthes arenaceodentata
Ending Date:	12 Nov-05 08:30 AM	**Dil Water:**	Not Applicable	**Source:**	Don Reisch
Setup Date:	02 Nov-05 02:55 PM	**Brine:**	Not Applicable		

Sample No:	09-1485-8133	**Material:**	Marine Sediment	**Client:**	LRTC
Sample Date:	17 Oct-05	**Code:**	10649	**Project:**	
Receive Date:	17 Oct-05 04:21 PM	**Source:**	LRTC		
Sample Age:	16d 14h (7.9 °C)	**Station:**	LRT-SO2 COMP		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
11-4119-0774	Proportion Survived	100	> 100	N/A	6.15%	Wilcoxon Rank Sum Two-Sample

Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Alcatraz	5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
0	Control Sed	5	0.98000	0.90000	1.00000	0.02000	0.04472	4.56%
0	Quartz Control	5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
0	San Pablo	5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		5	0.96000	0.90000	1.00000	0.02449	0.05477	5.71%

Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Alcatraz	1.00000	1.00000	1.00000	1.00000	1.00000
0	Control Sed	1.00000	0.90000	1.00000	1.00000	1.00000
0	Quartz Control	1.00000	1.00000	1.00000	1.00000	1.00000
0	San Pablo	1.00000	1.00000	1.00000	1.00000	1.00000
100		1.00000	1.00000	0.90000	0.90000	1.00000

CETIS Analysis Detail

Acute Polychaete Survival Test — **Pacific EcoRisk**

Test No:	09-8221-3566	**Test Type:**	Survival	**Duration:**	9d 17h
Start Date:	02 Nov-05 02:55 PM	**Protocol:**	ASTM E1192-97 (1997)	**Species:**	Neanthes arenaceodentata
Ending Date:	12 Nov-05 08:30 AM	**Dil Water:**	Not Applicable	**Source:**	Don Reisch
Setup Date:	02 Nov-05 02:55 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	01-9278-7685	14-3715-5783	29 Nov-05 10:23 AM	CETISv1.1.1

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	6.15%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.50000	23.15450	0.70400	Equal Variances
Distribution	Shapiro-Wilk W	0.75864		0.00455	Non-normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0026559	0.0026559	1	0.40	0.54474	Non-Significant Effect
Error	0.0531187	0.0066398	8			
Total	0.0557746	0.0092958	9			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Control Sed		100	25		0.3452	5	Non-Significant Effect

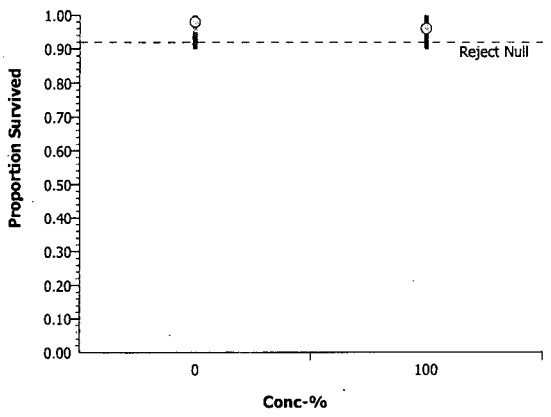
Data Summary

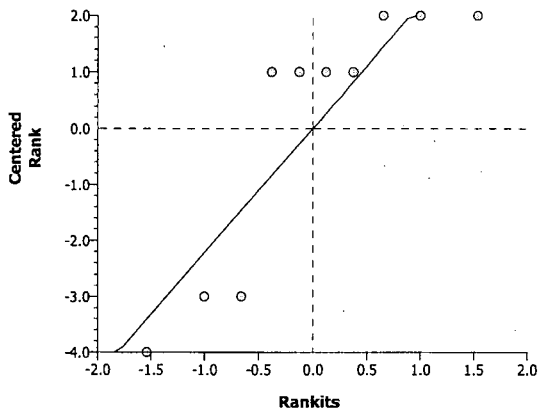
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Control Sed	5	0.98000	0.90000	1.00000	0.04472	6.00000	2.00000	7.00000	2.23607
100		5	0.96000	0.90000	1.00000	0.05477	5.00000	2.00000	7.00000	2.73861

Data Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Control Sed	1.00000	0.90000	1.00000	1.00000	1.00000					
100		1.00000	1.00000	0.90000	0.90000	1.00000					

Graphics





Pacific EcoRisk Environmental Consulting and Testing

10-Day Estuarine/Marine Sediment Toxicity Test Data

Client: LRTC Test ID#: 15584 AB Date (Day 0): 11/2/05

Species: *Neanthes arenaceodentata* Organism Log#: 2500 Organism Supplier: Don Reish

Day of Test	Test Replicate	Sample ID: LRT-S02 Temp (°C)	pH	D.O. (mg/L)	Salinity (ppt)	# Alive	Sign-Off
Day 0	Rep A	20.2	7.82	7.0	30.6	10	Date: 11/2/05 Time: 14.55 WQ: RP Scientist: MM AB
	Rep B	20.4	7.84	6.9	30.6	10	
	Rep C	20.3	7.85	6.9	30.5	10	
	Rep D	20.3	7.86	6.9	30.6	10	
	Rep E	20.1	7.87	7.0	30.5	10	
Day 1	Rep A	19.7	7.99	7.4	30.9		Date: 11/3/05 Time: WQ: RP 10.56
Day 2	Rep B	19.9	8.07	7.3	31.6		Date: 11/4/05 Time: WQ: RP 15.05
Day 3	Rep C	20.1	7.98	7.3	31.0		Date: 11/5/05 Time: WQ: RP 9.40
Day 4	Rep D	19.9	8.10	7.2	30.2		Date: 11-6-05 Time: 1010 WQ: CS
Day 5	Rep E	20.5	8.01	6.9	31.3		Date: 11-7-05 Time: WQ: YK 12:30
Day 6	Rep A	20.8	8.05	6.5	31.4		Date: 11-8-05 Time: WQ: YK 15:00
Day 7	Rep B	20.1	8.15	7.6	31.5		Date: 11-9-05 Time: 0830 WQ: YK
Day 8	Rep C	20.7	7.94	7.2	30.4		Date: 11-10-05 Time: WQ: YK 11:00
Day 9	Rep D	20.0	8.06	7.6	31.4		Date: 11/11/05 Time: WQ: RP 14.20
Day 10	Rep A	20.0	8.04	7.4	31.8	10	Date: 11/12/05 Time: 830 WQ: RP Scientist: MM
	Rep B	20.0	8.08	7.3	30.6	10	
	Rep C	20.1	8.11	7.4	30.5	9	
	Rep D	19.8	8.10	7.4	30.8	9	
	Rep E	19.9	8.06	7.3	31.6	10	

Day of Test	Matrix	pH	D.O. (mg/L)	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L)	Sign-Off
Day 0	Porewater	7.65	6.1	29.0	0.087	✓ 12.8	Date: 11/2/05 Time: WQ: RP 14.55
	Overlying Water					✓ <1.0	Date: 11-2-05 Time: MM WQ: AP
Day 10	Porewater	7.65	5.4	30.7	0.030	✓ 1.1	Date: 11/12/05 Time: WQ: RP 13.00
	Overlying Water					✓ <1.0	Date: 11-12-05 Time: WQ: YK 1200

Pacific EcoRisk Environmental Consulting and Testing

10-Day Estuarine/Marine Sediment Toxicity Test Data

Client: LRTC Test ID#: 15581 | 15584 Date (Day 0): 11/2/05

Species: *Neanthes arenaceodentata* Organism Log#: 2500 Organism Supplier: Don Reiche

Day of Test	Test Replicate	Sample ID: Control					Sign-Off
		Temp (°C)	pH	D.O. (mg/L)	Salinity (ppt)	# Alive	
Day 0	Rep A	20.4	7.93	7.2	30.2	10	Date: 11/2/05 Time: 14:55 WQ: RP Scientist: MM AB
	Rep B	20.2	7.95	7.2	30.2	10	
	Rep C	20.1	7.98	7.2	30.2	10	
	Rep D	20.2	7.97	7.2	30.2	10	
	Rep E	20.1	7.99	7.2	~~30.6~~ RP	10	
Day 1	Rep A	19.7	7.96	7.0	30.9		Date: 11/3/05 Time: WQ: RP 10:50
Day 2	Rep B	19.9	8.01	7.3	31.4		Date: 11/4/05 Time: WQ: RP 15:05
Day 3	Rep C	20.1	7.89	7.3	31.1		Date: 11/5/05 Time: WQ: RP 9:40
Day 4	Rep D	19.9	~~7.90~~ 8.07 CS	~~7.3~~ 6.9 CS	~~30.4~~ 31.2 CS		Date: 11-6-05 Time: 8:40 WQ: CS
Day 5	Rep E	20.5	~~7.79~~ 7.90	~~6.8~~ 6.8	31.3		Date: 11-7-05 Time: WQ: VK 12:30
Day 6	Rep A	20.8	7.98	6.9	31.0		Date: 11-8-05 Time: WQ: VK 15:00
Day 7	Rep B	20.0	8.10	7.9	30.2		Date: 11-9-05 Time: 0830 WQ: RP
Day 8	Rep C	20.7	7.75	6.8	31.2		Date: 11-10-05 Time: WQ: VK 11:00
Day 9	Rep D	20.0	8.14	7.8	31.1		Date: 11/11/05 Time: WQ: RP 14:20
Day 10	Rep A	20.2	7.88	7.3	30.4	10	Date: 11/12/05 Time: ~~8:15~~ RP 8:30 WQ: RP Scientist: MM
	Rep B	20.0	7.96	7.4	31.4	9	
	Rep C	20.0	8.03	7.4	31.1	10	
	Rep D	20.0	8.14	7.4	30.7	10	
	Rep E	19.6	8.05	7.5	30.5	10	

Day of Test	Matrix	pH	D.O. (mg/L)	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L)	Sign-Off
Day 0	Porewater	7.65	5.1	~~29~~ 31 RP	0.011	✓ 2.23	Date: 11/2/05 Time: WQ: RP 14:53
	Overlying Water					✓ <1.0	Date: 11-2-05 Time: NM WQ: AG
Day 10	Porewater	7.48	6.3	30.8	0.034	✓ <1.0	Date: 11/12/05 Time: WQ: RP 1300
	Overlying Water					✓ <1.0	Date: 11-12-05 Time: 1200 WQ: VK

Pacific EcoRisk Environmental Consulting and Testing

10-Day Estuarine/Marine Sediment Toxicity Test Data

Client: LRTC Test ID#: 15581/15584 AB Date (Day 0): 11/2/05

Species: *Neanthes arenaceodentata* Organism Log#: 2500 Organism Supplier: Don Reish

Day of Test	Test Replicate	Sample ID: Alcatraz					Sign-Off
		Temp (°C)	pH	D.O. (mg/L)	Salinity (ppt)	# Alive	
Day 0	Rep A	20.3	7.98	7.3	30.6	10	Date: 11/2/05 Time: 14:55 WQ: RP Scientist: MM AB
	Rep B	20.2	8.01	7.3	30.6	10	
	Rep C	20.3	7.98	7.2	30.5	10	
	Rep D	20.4	8.01	7.3	30.6	10	
	Rep E	20.4	8.01	7.2	30.6	10	
Day 1	Rep A	19.7	8.05	7.5	31.0		Date: 11/3/05 Time: WQ: RP 1050
Day 2	Rep B	19.9	8.05	7.3	31.4		Date: 11/4/05 Time: WQ: RP 0805
Day 3	Rep C	20.1	7.97	7.4	31.2		Date: 11/5/05 Time: WQ: RP 9:40
Day 4	Rep D	19.9	8.08	7.2	30.7		Date: 11/6/05 Time: 1010 WQ: CS
Day 5	Rep E	20.5	8.01	7.0	31.1		Date: 11-7-05 Time: WQ: VK 12:30
Day 6	Rep A	20.8	8.04	6.8	31.0		Date: 11-8-05 Time: WQ: VK 15:00
Day 7	Rep B	20.1	8.12	7.5	30.8		Date: 11-9-05 Time: 0830 WQ: VK
Day 8	Rep C	20.7	7.92	7.0	30.4		Date: 11-10-05 Time: WQ: VK 11:00
Day 9	Rep D	20.0	8.09	7.6	31.8		Date: 11/11/05 Time: WQ: RP 14:20
Day 10	Rep A	20.1	8.01	7.4	31.1	10	Date: 11/12/05 Time: 830 WQ: RP Scientist: MM
	Rep B	20.1	8.06	7.4	31.1	10	
	Rep C	20.1	8.06	7.4	30.5	10	
	Rep D	20.1	8.05	7.4	31.1	10	
	Rep E	20.1	8.04	7.5	31.0	10	

Day of Test	Matrix	pH	D.O. (mg/L)	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L)	Sign-Off
Day 0	Porewater	7.62	6.7	29.8	0.018	✓ 4.0	Date: 11/2/05 Time: WQ: RP 14:55
	Overlying Water					✓ <1.0	Date: 11-2-05 Time: MM WQ: AG
Day 10	Porewater	7.80	7.0	30.4	0.281	✓ <1.0	Date: 11/12/05 Time: WQ: RP 13:00
	Overlying Water					✓ <1.0	Date: 11-12-05 Time: 1200 WQ: VK

Pacific EcoRisk Environmental Consulting and Testing

10-Day Estuarine/Marine Sediment Toxicity Test Data

Client: LRTC Test ID#: 15581/15582 4 AB Date (Day 0): 11/2/05

Species: *Neanthes arenaceodentata* Organism Log#: 2500 Organism Supplier: Don Reiche

Day of Test	Test Replicate	Sample ID: San Pablo					Sign-Off
		Temp (°C)	pH	D.O. (mg/L)	Salinity (ppt)	# Alive	
Day 0	Rep A	20.1	7.98	7.3	30.3	10	Date: 11/2/05 Time: 14.55 WQ: RP Scientist: MM AB
	Rep B	20.2	8.02	7.3	30.3	10	
	Rep C	20.4	7.98	7.2	29.5	10	
	Rep D	20.2	8.03	7.3	30.5	10	
	Rep E	20.4	8.01	7.3	30.4	10	
Day 1	Rep A	19.7	8.03	7.4	30.3		Date: 11/3/05 Time: WQ: RP 10.50
Day 2	Rep B	19.9	8.06	7.4	31.2		Date: 11/4/05 Time: WQ: RP 15.05
Day 3	Rep C	20.1	7.98	7.4	30.2		Date: 11/5/05 Time: WQ: RP 9.46
Day 4	Rep D	19.9	8.07	7.1	30.7		Date: 11/6/05 Time: 1010 WQ: CS
Day 5	Rep E	20.1	8.02	7.1	30.6		Date: 11-7-05 Time: WQ: VK 12:30
Day 6	Rep A	20.8	8.06	6.9	30.5		Date: 11-8-05 Time: WQ: VK 15:00
Day 7	Rep B	20.0	8.13	7.7	30.4		Date: 11-9-05 Time: 0830 WQ: VK
Day 8	Rep C	20.7	7.89	7.0	30.5		Date: 11-10-05 Time: WQ: VK 11:00
Day 9	Rep D	20.0	8.09	7.8	31.3		Date: 11/11/05 Time: WQ: RP 14.20
Day 10	Rep A	19.9	7.95	7.3	30.7	10	Date: 11/12/05 Time: 830 WQ: RP Scientist: MM
	Rep B	19.9	8.00	7.4	30.7	10	
	Rep C	20.1	8.03	7.4	30.2	10	
	Rep D	19.9	8.06	7.5	31.6	10	
	Rep E	20.0 19.8	8.07	7.5	31.3	10	

Day of Test	Matrix	pH	D.O. (mg/L)	Salinity (ppt)	Total Sulfide (mg/L)	Total Ammonia (mg/L)	Sign-Off
Day 0	Porewater	7.70	6.6	29.9	0.129	✓ <1.0 RS	Date: 11/2/05 Time: WQ: RP 14.55
	Overlying Water					✓ <1.0	Date: 11-2-05 Time: MM WQ: AG
Day 10	Porewater	7.68	7.2	30.7	0.351	✓ <1.0	Date: 11/12/05 Time: WQ: RP 13:00
	Overlying Water					✓ <1.0	Date: 11-12-05 Time: 1200 WQ: VK

Appendix G

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Polychaete, *Neanthes arenaceodentata*

CETIS Test Summary

Report Date: 09 Nov-05 3:13 PM
Test Link: 17-7065-2481/15587

Acute Polychaete Survival Test — **Pacific EcoRisk**

Test No:	12-8457-6412	**Test Type:**	Survival (96h)	**Duration:**	94h
Start Date:	02 Nov-05 04:15 PM	**Protocol:**	ASTM (1994)	**Species:**	Neanthes arenaceodentata
Ending Date:	06 Nov-05 02:20 PM	**Dil Water:**	Seawater	**Source:**	Don Reisch
Setup Date:	02 Nov-05 04:15 PM	**Brine:**			

Sample No:	09-4425-6676	**Material:**	Cadmium chloride	**Client:**	
Sample Date:	02 Nov-05	**Code:**	10659	**Project:**	
Receive Date:	02 Nov-05	**Source:**	Reference Toxicant		
Sample Age:	16h	**Station:**			

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
16-5988-7463	96h Proportion Survived	4	8	5.6569	N/A	Fisher Exact

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
17-1587-4089	96h Proportion Survived	50	5.656854	4.5434	7.043184	Trimmed Spearman-Karber

96h Proportion Survived Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Lab Water	2	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
1		2	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
2		2	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
4		2	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
8		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%
16		2	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

96h Proportion Survived Detail

Conc-µg/L	Control Type	Rep 1	Rep 2
0	Lab Water	1.00000	1.00000
1		1.00000	1.00000
2		1.00000	1.00000
4		1.00000	1.00000
8		0.00000	0.00000
16		0.00000	0.00000

CETIS Analysis Detail

Acute Polychaete Survival Test — **Pacific EcoRisk**

Test No:	12-8457-6412	**Test Type:**	Survival (96h)	**Duration:**	94h
Start Date:	02 Nov-05 04:15 PM	**Protocol:**	ASTM (1994)	**Species:**	Neanthes arenaceodentata
Ending Date:	06 Nov-05 02:20 PM	**Dil Water:**	Seawater	**Source:**	Don Reisch
Setup Date:	02 Nov-05 04:15 PM	**Brine:**			

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Comparison	17-7065-2481	17-7065-2481	09 Nov-05 3:12 PM	CETISv1.1.1

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Fisher Exact	C > T	Untransformed		4	8	25	5.6569	

Group Comparisons

Control	vs	Conc-µg/L	Statistic	P-Value	Decision(0.05)
Lab Water		1	1.00000	1.00000	Non-Significant Effect
Lab Water		2	1.00000	1.00000	Non-Significant Effect
Lab Water		4	1.00000	1.00000	Non-Significant Effect
Lab Water		8	0.00001	0.00001	Significant Effect
Lab Water		16	0.00001	0.00001	Significant Effect

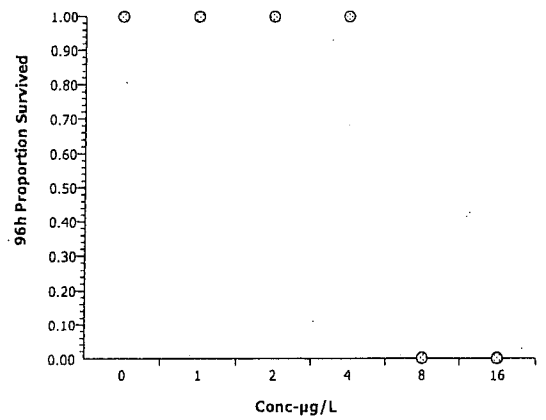
Data Summary

Conc-µg/L	Control Type	Non-Responders	Responders	Total Observed
0	Lab Water	9	0	9
1		10	0	10
2		9	0	9
4		10	0	10
8		0	10	10
16		0	10	10

Data Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Lab Water	1.00000	1.00000								
1		1.00000	1.00000								
2		1.00000	1.00000								
4		1.00000	1.00000								
8		0.00000	0.00000								
16		0.00000	0.00000								

Graphics



Report Date: 09 Nov-05 3:13 PM
Analysis: 17-1587-4089/15587

CETIS Analysis Detail

Acute Polychaete Survival Test — **Pacific EcoRisk**

Test No:	12-8457-6412	**Test Type:**	Survival (96h)	**Duration:**	94h
Start Date:	02 Nov-05 04:15 PM	**Protocol:**	ASTM (1994)	**Species:**	Neanthes arenaceodentata
Ending Date:	06 Nov-05 02:20 PM	**Dil Water:**	Seawater	**Source:**	Don Reisch
Setup Date:	02 Nov-05 04:15 PM	**Brine:**			

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
96h Proportion Survived	Trimmed Spearman-Karber	17-7065-2481	17-7065-2481	09 Nov-05 3:12 PM	CETISv1.1.1

Spearman-Karber Options

Threshold Option	Lower Threshold	Trim	μ	σ
Control Threshold	0	0.00%	0.752575	0

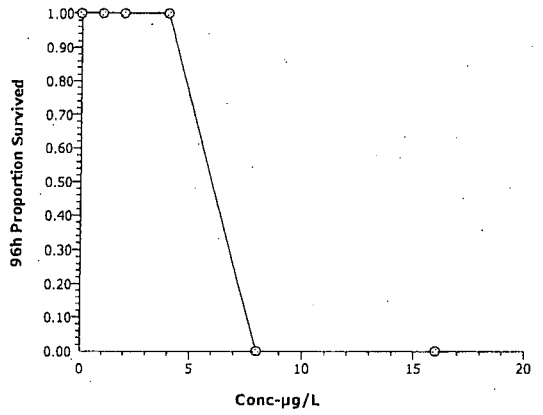
Point Estimates

EC50/LC50	95% LCL	95% UCL
5.65685	4.54340	7.04318

Data Summary

Conc-µg/L	Control Type	Count	Calculated Variate(A/B) Mean	Minimum	Maximum	SE	SD	A	B
0	Lab Water	2	1.00000	1.00000	1.00000	0.00000	0.00000	9	9
1		2	1.00000	1.00000	1.00000	0.00000	0.00000	10	10
2		2	1.00000	1.00000	1.00000	0.00000	0.00000	9	9
4		2	1.00000	1.00000	1.00000	0.00000	0.00000	10	10
8		2	0.00000	0.00000	0.00000	0.00000	0.00000	0	10
16		2	0.00000	0.00000	0.00000	0.00000	0.00000	0	10

Graphics



Analyst: _____ Approval: DKW

96 Hour Marine Reference Toxicant Test Data

Client: PER Test Date: 11/2/05 Test ID#: 15587

Species: *Neanthes arenaceodentata* Organism Log #: 2500 Test Material: $CdCl_2$

Treatment (mgCd/L)	Temp	pH	DO	Salinity	# Live Animals A	# Live Animals B	Sign-off
Control	20.0	7.74	8.9	30.5	5	5	Time: 1615
1	20.0	7.76	8.8	30.8	5	5	
2	20.0	7.77	8.8	30.7	5	5	Date: 11-2-05
4	20.0	7.78	8.6	30.9	5	5	
8	20.0	7.78	8.6	30.8	5	5	Name: MM
16	20.0	7.78	8.6	30.8	5	5	
Control	20.3	7.81	8.9	30.6	5	5	Time: 0920
1	20.3	7.81	8.8	30.8	5	5	
2	20.3	7.83	8.8	30.8	5	5	Date: 11/3/05
4	20.3	7.83	8.7	30.8	5	5	
8	20.3	7.83	8.8	30.6	5	5	Name: DH
16	20.3	7.83	8.6	30.7	0	0	
Control	20.0	7.87	7.0	31.0	5	4	Time: 1412
1	20.0	7.87	7.0	31.1	5	5	
2	20.0	7.93	7.9	30.1	5	5	Date: 11-4-05
4	20.0	7.88	7.0	31.0	5	5	
8	20.0	7.87	6.3	31.4	5	5	Name: ~~AB~~ RT
16	20.0	—	—	—	—	—	
Control	19.8	7.85	8.2	30.7	5	4	Time: 1220
1	19.8	7.84	8.0	30.5	5	5	
2	19.8	7.86	8.5	30.9	4	5	Date: 11-5-05
4	19.8	7.87	8.2	30.8	5	5	
8	19.8	7.85	8.5	30.0	~~AB~~ 2	1	Name: ~~AB~~ SL
16	19.8	—	—	—	—	—	
Control	19.6	7.91	7.2	30.9	5	4	Time: 1420
1	19.6	7.93	6.5	30.9	5	5	
2	19.6	7.94	7.1	31.0	4	5	Date: 11/6/05
4	19.6	7.95	7.0	30.9	5	5	
8	19.6	7.94	7.1	30.9	0	0	Name: DG CS
16	19.6	—	—	—	—	—	

Appendix H

Test Data and Summary of Statistics for the Toxicity Evaluation of Levin Richmond Sediment Elutriate with Mussel *(Mytilus sp.)* Embryos

CETIS Test Summary

Report Date: 13 Dec-05 11:55 AM
Test Link: 07-1439-1276/15582

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Test No:	01-2220-1463	**Test Type:**	Development-Survival	**Duration:**	46h
Start Date:	26 Oct-05 05:10 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Mytilis edulis
Ending Date:	28 Oct-05 03:30 PM	**Dil Water:**	Seawater	**Source:**	Carlsbad Aquafarms
Setup Date:	26 Oct-05 05:10 PM	**Brine:**	Not Applicable		

Sample No:	05-1546-4421	**Material:**	Elutriate	**Client:**	LRTC
Sample Date:	26 Oct-05	**Code:**	10649	**Project:**	
Receive Date:	26 Oct-05	**Source:**	LRTC		
Sample Age:	17h (7.9 °C)	**Station:**	LRT-SO2 COMP		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
13-8082-7374	Proportion Normal	10	25	15.811	32.28%	Steel Many-One Rank
08-4026-3768	Proportion Survived	50	100	70.711	37.75%	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-%	95% LCL	95% UCL	Method
12-3514-6270	Proportion Normal	5	0.249382	0.09185893	0.9982331	Linear Interpolation
		10	0.4987639	0.1837179	38.64609	
		15	0.7481459	0.2755768	51.32386	
		20	0.9975278	0.3674357	75.14884	
		25	34.19734	N/A	63.19596	
		40	54.88333	30.65126	66.79404	
		50	62.40277	40.32502	72.32837	
06-6424-9878	Proportion Survived	50	57.88815	56.20427	59.62247	Trimmed Spearman-Karber

Proportion Normal Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Seawater Cont	5	0.92728	0.90452	0.94660	0.00753	0.01685	1.82%
0	Site Water	5	0.86087	0.73228	0.91388	0.03319	0.07422	8.62%
1		5	0.59266	0.02893	0.90638	0.16956	0.37916	63.98%
10		5	0.83107	0.69194	0.92511	0.04869	0.10888	13.10%
25		5	0.80036	0.47783	0.92275	0.08160	0.18247	22.80%
50		5	0.61659	0.25630	0.89316	0.10820	0.24194	39.24%
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Proportion Survived Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Seawater Cont	5	0.93052	0.84507	1.00000	0.03055	0.06831	7.34%
0	Site Water	5	0.89577	0.85915	0.94366	0.01458	0.03259	3.64%
1		5	0.63662	0.03286	1.00000	0.17901	0.40028	62.88%
10		5	0.91174	0.72300	1.00000	0.05502	0.12303	13.49%
25		5	0.81127	0.45540	1.00000	0.09479	0.21196	26.13%
50		5	0.65728	0.28638	0.98122	0.11670	0.26095	39.70%
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Analyst:_____ Approval:_____

CETIS Test Summary

Report Date: 13 Dec-05 11:55 AM
Test Link: 07-1439-1276/15582

Proportion Normal Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Seawater Cont	0.92531	0.90452	0.94059	0.91935	0.94660
0	Site Water	0.73228	0.89767	0.89732	0.86321	0.91388
1		0.02893	0.38211	0.90638	0.75799	0.88789
10		0.69194	0.73684	0.88293	0.91852	0.92511
25		0.86224	0.47783	0.84956	0.92275	0.88940
50		0.25630	0.52535	0.65812	0.75000	0.89316
100		0.00000	0.00000	0.00000	0.00000	0.00000

Proportion Survived Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Seawater Cont	1.00000	0.84507	0.89202	1.00000	0.91549
0	Site Water	0.87324	0.90610	0.94366	0.85915	0.89671
1		0.03286	0.44131	1.00000	0.77934	0.92958
10		1.00000	0.72300	0.84977	1.00000	0.98592
25		0.79343	0.45540	0.90141	1.00000	0.90610
50		0.28638	0.53521	0.72300	0.76056	0.98122
100		0.00000	0.00000	0.00000	0.00000	0.00000

CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Test No:	01-2220-1463	**Test Type:**	Development-Survival	**Duration:**	46h
Start Date:	26 Oct-05 05:10 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Mytilis edulis
Ending Date:	28 Oct-05 03:30 PM	**Dil Water:**	Seawater	**Source:**	Carlsbad Aquafarms
Setup Date:	26 Oct-05 05:10 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Comparison	07-1439-1276	07-1439-1276	13 Dec-05 11:55 AM	CETISv1.1.1

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		50	100	2	70.711	37.75%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Bartlett	5.08662	13.27670	0.27852	Equal Variances
Distribution	Shapiro-Wilk W	0.97672		0.81346	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.7016914	0.1754229	4	1.58	0.21760	Non-Significant Effect
Error	2.216656	0.1108328	20			
Total	2.9183479	0.2862557	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Seawater Control		1	1.82538	2.30451	0.1190	0.48522	Non-Significant Effect
		10	0.03504	2.30451	0.7884	0.48522	Non-Significant Effect
		25	0.82078	2.30451	0.4591	0.48522	Non-Significant Effect
		50	1.76337	2.30451	0.1320	0.48522	Non-Significant Effect

Data Summary

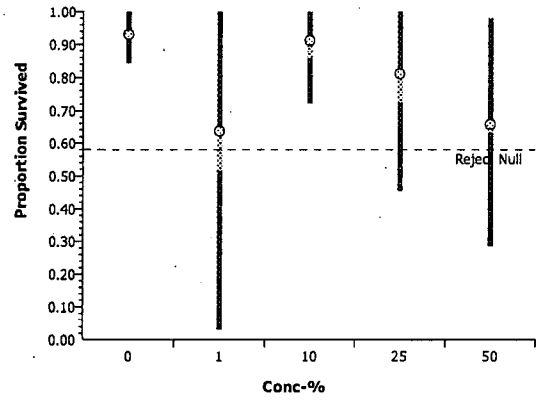
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Seawater Cont	5	0.93052	0.84507	1.00000	0.06831	1.35022	1.16624	1.53653	0.17454
1		5	0.63662	0.03286	1.00000	0.40028	0.96588	0.18229	1.53653	0.52997
10		5	0.91174	0.72300	1.00000	0.12303	1.34284	1.01655	1.53653	0.23574
25		5	0.81127	0.45540	1.00000	0.21196	1.17740	0.74074	1.53653	0.29069
50		5	0.65728	0.28638	0.98122	0.26095	0.97894	0.56468	1.43333	0.32056

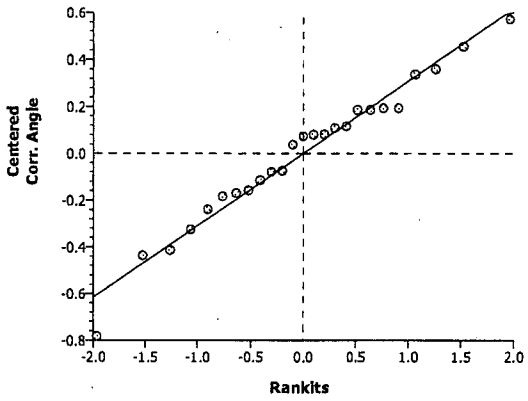
Data Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Seawater Cont	1.00000	0.84507	0.89202	1.00000	0.91549					
1		0.03286	0.44131	1.00000	0.77934	0.92958					
10		1.00000	0.72300	0.84977	1.00000	0.98592					
25		0.79343	0.45540	0.90141	1.00000	0.90610					
50		0.28638	0.53521	0.72300	0.76056	0.98122					

CETIS Analysis Detail

Graphics





CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Test No:	01-2220-1463	**Test Type:**	Development-Survival	**Duration:**	46h
Start Date:	26 Oct-05 05:10 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Mytilis edulis
Ending Date:	28 Oct-05 03:30 PM	**Dil Water:**	Seawater	**Source:**	Carlsbad Aquafarms
Setup Date:	26 Oct-05 05:10 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	07-1439-1276	07-1439-1276	13 Dec-05 11:55 AM	CETISv1.1.1

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Steel Many-One Rank	C > T	Rank		10	25	10	15.811	32.28%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Bartlett	17.16415	13.27670	0.00180	Unequal Variances
Distribution	Shapiro-Wilk W	0.92516		0.06723	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.6294709	0.1573677	4	2.26	0.09846	Non-Significant Effect
Error	1.391106	0.0695553	20			
Total	2.02057719	0.2269230	24			

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Seawater Control		1	16	17	0.0277	0	Significant Effect
		10	18	17	0.0740	0	Non-Significant Effect
		25	17	17	0.0463	0	Significant Effect
		50	15	17	0.0158	0	Significant Effect

Data Summary

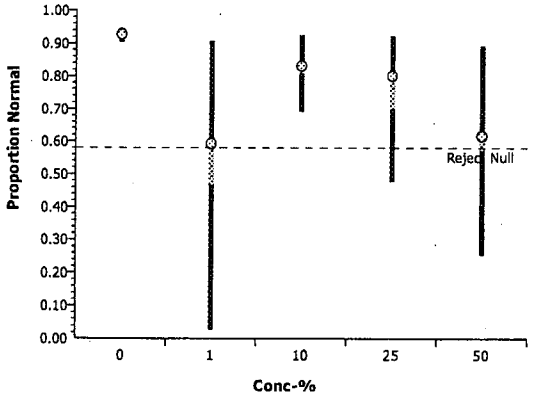
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Seawater Cont	5	0.92728	0.90452	0.94660	0.01685	21.8	17	25	3.2711
1		5	0.59266	0.02893	0.90638	0.37916	9.2	1	18	7.1903
10		5	0.83107	0.69194	0.92511	0.10888	13.8	7	22	6.6106
25		5	0.80036	0.47783	0.92275	0.18247	12.6	4	21	6.1887
50		5	0.61659	0.25630	0.89316	0.24194	7.6	2	16	5.3198

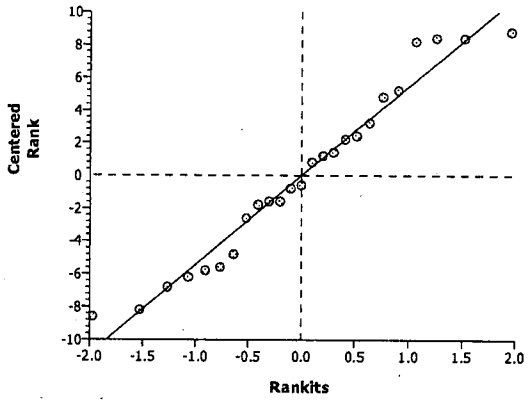
Data Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Seawater Cont	0.92531	0.90452	0.94059	0.91935	0.94660					
1		0.02893	0.38211	0.90638	0.75799	0.88789					
10		0.69194	0.73684	0.88293	0.91852	0.92511					
25		0.86224	0.47783	0.84956	0.92275	0.88940					
50		0.25630	0.52535	0.65812	0.75000	0.89316					

CETIS Analysis Detail

Graphics





CETIS Analysis Detail

Report Date: 13 Dec-05 11:55 AM
Analysis: 06-6424-9878/15582

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Test No:	01-2220-1463	**Test Type:**	Development-Survival	**Duration:**	46h
Start Date:	26 Oct-05 05:10 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Mytilis edulis
Ending Date:	28 Oct-05 03:30 PM	**Dil Water:**	Seawater	**Source:**	Carlsbad Aquafarms
Setup Date:	26 Oct-05 05:10 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Survived	Trimmed Spearman-Karber	07-1439-1276	07-1439-1276	13 Dec-05 11:55 AM	CETISv1.1.1

Spearman-Karber Options

Threshold Option	Lower Threshold	Trim	μ	σ
Control Threshold	0.06948357	15.47%	1.76259	0.006410167

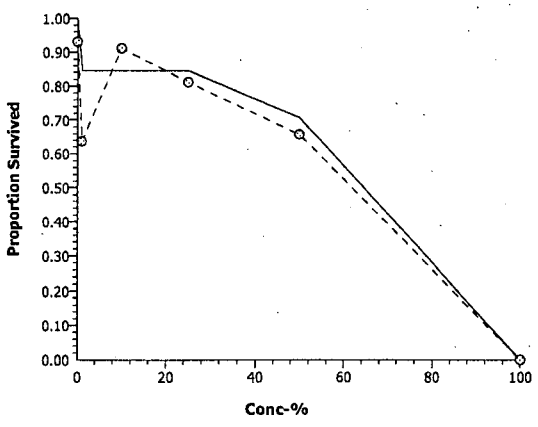
Point Estimates

EC50/LC50	95% LCL	95% UCL
57.88815	56.20427	59.62247

Data Summary

			Calculated Variate(A/B)						
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Seawater Contro	5	0.93052	0.84507	1.00000	0.01394	0.06831	991	1065
1		5	0.63662	0.03286	1.00000	0.08171	0.40028	678	1065
10		5	0.91174	0.72300	1.00000	0.02511	0.12303	971	1065
25		5	0.81127	0.45540	1.00000	0.04327	0.21196	864	1065
50		5	0.65728	0.28638	0.98122	0.05327	0.26095	700	1065
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	1065

Graphics



CETIS Analysis Detail

Report Date: 13 Dec-05 11:55 AM
Analysis: 12-3514-6270/15582

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Test No:	01-2220-1463	**Test Type:**	Development-Survival	**Duration:**	46h
Start Date:	26 Oct-05 05:10 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Mytilis edulis
Ending Date:	28 Oct-05 03:30 PM	**Dil Water:**	Seawater	**Source:**	Carlsbad Aquafarms
Setup Date:	26 Oct-05 05:10 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Interpolation	07-1439-1276	07-1439-1276	13 Dec-05 11:55 AM	CETISv1.1.1

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	5334240	280	Yes	Two-Point Interpolation

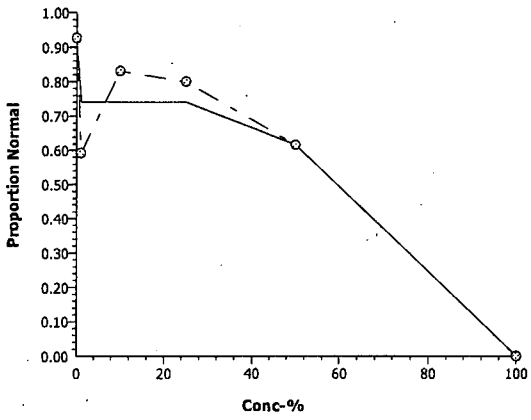
Point Estimates

% Effect	Conc-%	95% LCL	95% UCL
5	0.249382	0.09185893	0.9982331
10	0.4987639	0.1837179	38.64609
15	0.7481459	0.2755768	51.32386
20	0.9975278	0.3674357	75.14884
25	34.19734	N/A	63.19596
40	54.88333	30.65126	66.79404
50	62.40277	40.32502	72.32837

Data Summary

			Calculated Variate(A/B)						
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Seawater Contro	5	0.92728	0.90452	0.94660	0.00344	0.01685	1016	1096
1		5	0.59266	0.02893	0.90638	0.07740	0.37916	678	1165
10		5	0.83107	0.69194	0.92511	0.02222	0.10888	1085	1333
25		5	0.80036	0.47783	0.92275	0.03725	0.18247	866	1075
50		5	0.61659	0.25630	0.89316	0.04939	0.24194	700	1139
100		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	1145

Graphics



Mytilus spp. Development Toxicity Test Count Data

Client: LRTC
Test Material: LRT-S02
Test ID #: 15582
Project #: 10649

Test Start Date: 10/26/05
Test End Date: 10/28/05
Enumeration Date: 11/7/05
Investigator: MM

Concentration	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development	Percent Survival
Control	A	223	18	241	93	100
	B	~~180 222~~	~~19 14~~	~~199 236~~	~~90 94~~ mm	85
	C	190	12	202	94	89
	D	228	20	248	92	100
	E	195	11	206	95	92
1.0%	A	~~70 7~~	~~195 195~~	~~202 205 265~~ mm	~~3.5 2m 26.4~~	~~95~~
	B	~~229 94~~	~~14 152~~	~~236 246~~	~~94 38.2~~ mm	100
	C	~~225 213~~	~~13 22~~	~~235 238~~	~~95 90.6~~ mm	100
	D	166	53	219	75.8	100
	E	198	25	223	88.8	100
10%	A	~~130 292~~	~~292 mm 130~~	422	~~mm 30.8~~ 69.2	100
	B	154	55	209	73.7	98
	C	181	24	205	88.3	96
	D	248	22	270	91.9	100
	E	210	17	227	92.5	100
25%	A	~~183 mm 313 169~~	~~19 mm 27 311~~	~~196 202 mm 624~~	~~90.6 mm 50.2 86.2~~	92
	B	97	106	203	47.8	~~95~~
	C	192	34	226	85.0	100
	D	215	18	233	92.3	100
	E	193	24	217	88.9	100
50%	A	61	177	238	25.6	100
	B	114	103	217	52.5	100
	C	154	80	234	65.8	100
	D	162	54	216	75.0	100
	E	209	25	234	89.3	100
100%	A	0	235	235	0	100
	B	0	209	209	0	98
	C	0	221	221	0	100
	D	0	258	258	0	100
	E	0	222	222	0	100

Mytilus spp. Development Toxicity Test Water Chemistry Data

Client: LRTC
Test Material: LRT-S02
Test ID#: 15582 Project #: 10649
Test Date: 10-26-05 Randomization: N/A

Organism Log#: 2493 Age: N/A
Organism Supplier: Carlsbad Aquafarms
Control/Diluent: 30ppt FSW

Day 0

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	15.9	7.90	8.4	29.7	Sample ID: 13606
1.0%	15.9	7.78	8.3	30.0	Test Solution Prep: AB
10%	15.9	7.80	8.1	30.2	New WQ: RF
25%	15.9	7.85	8.1	30.1	Innoculation Date: 10-26-05
50%	15.9	7.80	7.9	30.0	Innoculation Time: 1710
100%	15.9	7.95	7.6	29.9	Innoculation Signoff: AB
Meter ID	#6	pH03	DO08	EC01	

Day 1

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	15.2	—	—	—	Date: 10-27-05
1.0%	15.2	—	—	—	Signoff: AB
10%	15.2	—	—	—	
25%	15.2	—	—	—	
50%	15.2	—	—	—	
100%	15.2	—	—	—	
Meter ID	#6	—	—	—	

Day 2

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	15.2	7.80	KN ~~9.5~~ 8.5	30.1	Termination Signoff: KN
1.0%	15.2	7.73	7.0	30.3	Termination Date: 10/28/05
10%	15.2	7.82	7.7	30.3	Termination Time: 1530
25%	15.2	7.90	7.5	30.3	Old WQ: KN
50%	15.2	8.01	7.7	30.2	
100%	15.2	8.12	8.0	31.0	
Meter ID	6	pH09	DO08	EC01	

Appendix I

Test Data and Summary of Statistics for the Reference Toxicant Evaluation of the Mussel *(Mytilus sp.)* Embryos

CETIS Test Summary

Report Date: 09 Nov-05 2:55 PM
Test Link: 16-6243-7236/15588

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Test No:	02-0948-6262	**Test Type:**	Development-Survival	**Duration:**	47h
Start Date:	26 Oct-05 05:10 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Mytilis edulis
Ending Date:	28 Oct-05 03:50 PM	**Dil Water:**	Seawater	**Source:**	Carlsbad Aquafarms
Setup Date:	26 Oct-05 05:10 PM	**Brine:**	Not Applicable		

Sample No:	17-7164-3747	**Material:**	Copper sulfate	**Client:**	
Sample Date:	26 Oct-05	**Code:**	PERQAQC	**Project:**	
Receive Date:	26 Oct-05	**Source:**	Reference Toxicant		
Sample Age:	17h	**Station:**	In House		

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
18-4206-8875	Proportion Normal	5	10	7.0711	4.69%	Dunnett's Multiple Comparison

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
05-0956-1164	Proportion Normal	5	5.10243	1.011285	5.250238	Linear Interpolation
		10	5.366898	5.16795	5.505048	
		15	5.631366	5.438688	5.761958	
		20	5.895833	5.709947	6.01764	
		25	6.160301	5.987473	6.273323	
		40	6.953704	6.79901	7.063171	
		50	7.482639	7.336267	7.594731	

Proportion Normal Summary

Conc-µg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Seawater Cont	5	0.91400	0.88000	0.94000	0.01030	0.02302	2.52%
1.25		5	0.91000	0.90000	0.93000	0.00548	0.01225	1.35%
2.5		5	0.88200	0.85000	0.92000	0.01241	0.02775	3.15%
5		5	0.89000	0.85000	0.92000	0.01183	0.02646	2.97%
10		5	0.02200	0.00000	0.06000	0.01114	0.02490	113.18
15		5	0.00400	0.00000	0.01000	0.00245	0.00548	136.93
20		5	0.00000	0.00000	0.00000	0.00000	0.00000	0.00%

Proportion Normal Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Seawater Cont	0.88000	0.91000	0.94000	0.93000	0.91000
1.25		0.93000	0.91000	0.91000	0.90000	0.90000
2.5		0.92000	0.87000	0.90000	0.87000	0.85000
5		0.92000	0.90000	0.88000	0.85000	0.90000
10		0.06000	0.00000	0.03000	0.00000	0.02000
15		0.00000	0.00000	0.01000	0.00000	0.01000
20		0.00000	0.00000	0.00000	0.00000	0.00000

Analyst:_____ Approval: DKH

CETIS Analysis Detail

Bivalve Larval Survival and Development Test — **Pacific EcoRisk**

Test No:	02-0948-6262	**Test Type:**	Development-Survival	**Duration:**	47h
Start Date:	26 Oct-05 05:10 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Mytilis edulis
Ending Date:	28 Oct-05 03:50 PM	**Dil Water:**	Seawater	**Source:**	Carlsbad Aquafarms
Setup Date:	26 Oct-05 05:10 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Comparison	16-6243-7236	16-6243-7236	09 Nov-05 2:55 PM	CETISv1.1.1

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Dunnett's Multiple Comparison	C > T	Angular (Corrected)		5	10	20	7.0711	4.69%

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Bartlett	8.32274	15.08627	0.13932	Equal Variances
Distribution	Shapiro-Wilk W	0.96718		0.46508	Normal Distribution

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	8.808187	1.761637	5	769.15	0.00000	Significant Effect
Error	0.0549688	0.0022904	24			
Total	8.86315529	1.7639277	29			

Group Comparisons

Control	vs	Conc-µg/L	Statistic	Critical	P-Value	MSD	Decision(0.05)
Seawater Control		1.25	0.27945	2.36175	0.7379	0.07149	Non-Significant Effect
		2.5	1.75483	2.36175	0.1512	0.07149	Non-Significant Effect
		5	1.34361	2.36175	0.2784	0.07149	Non-Significant Effect
		10	37.7439	2.36175	0.0000	0.07149	Significant Effect
		15	39.8127	2.36175	0.0000	0.07149	Significant Effect

Data Summary

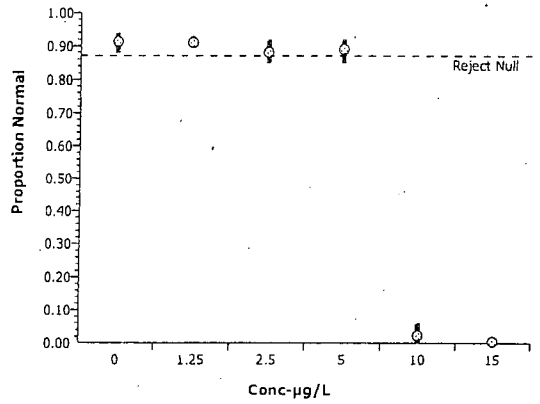
			Original Data				Transformed Data			
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Seawater Cont	5	0.91400	0.88000	0.94000	0.02302	1.27512	1.21705	1.32333	0.04073
1.25		5	0.91000	0.90000	0.93000	0.01225	1.26667	1.24905	1.30303	0.02205
2.5		5	0.88200	0.85000	0.92000	0.02775	1.22201	1.17310	1.28404	0.04409
5		5	0.89000	0.85000	0.92000	0.02646	1.23446	1.17310	1.28404	0.04169
10		5	0.02200	0.00000	0.06000	0.02490	0.13270	0.05002	0.24747	0.08462
15		5	0.00400	0.00000	0.01000	0.00548	0.07008	0.05002	0.10017	0.02747

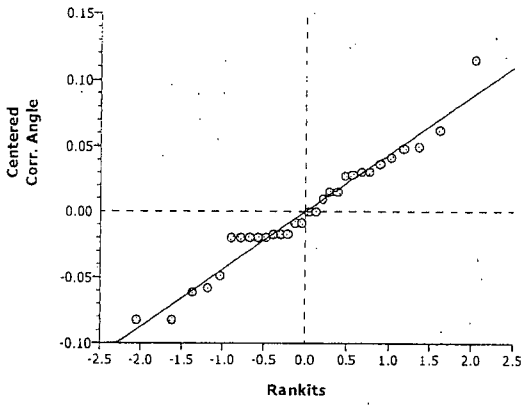
Data Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Seawater Cont	0.88000	0.91000	0.94000	0.93000	0.91000					
1.25		0.93000	0.91000	0.91000	0.90000	0.90000					
2.5		0.92000	0.87000	0.90000	0.87000	0.85000					
5		0.92000	0.90000	0.88000	0.85000	0.90000					
10		0.06000	0.00000	0.03000	0.00000	0.02000					
15		0.00000	0.00000	0.01000	0.00000	0.01000					

CETIS Analysis Detail

Graphics





CETIS Analysis Detail

Report Date: 09 Nov-05 2:55 PM
Analysis: 05-0956-1164/15588

Bivalve Larval Survival and Development Test — Pacific EcoRisk

Test No:	02-0948-6262	**Test Type:**	Development-Survival	**Duration:**	47h
Start Date:	26 Oct-05 05:10 PM	**Protocol:**	EPA/600/R-95/136 (1995)	**Species:**	Mytilis edulis
Ending Date:	28 Oct-05 03:50 PM	**Dil Water:**	Seawater	**Source:**	Carlsbad Aquafarms
Setup Date:	26 Oct-05 05:10 PM	**Brine:**	Not Applicable		

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Proportion Normal	Linear Interpolation	16-6243-7236	16-6243-7236	09 Nov-05 2:55 PM	CETISv1.1.1

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	9800032	280	Yes	Two-Point Interpolation

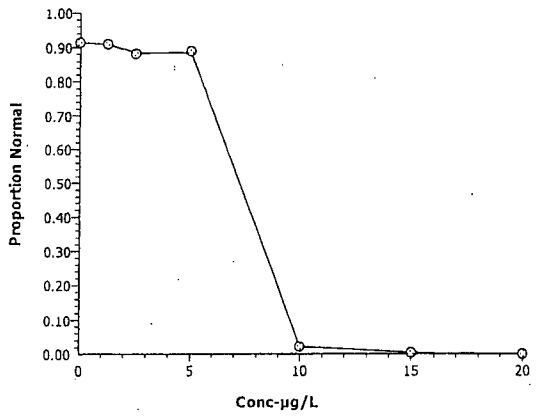
Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
5	5.10243	1.011285	5.250238
10	5.366898	5.16795	5.505048
15	5.631366	5.438688	5.761958
20	5.895833	5.709947	6.01764
25	6.160301	5.987473	6.273323
40	6.953704	6.79901	7.063171
50	7.482639	7.336267	7.594731

Data Summary

			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Seawater Contro	5	0.91400	0.88000	0.94000	0.00470	0.02302	457	500
1.25		5	0.91000	0.90000	0.93000	0.00250	0.01225	455	500
2.5		5	0.88200	0.85000	0.92000	0.00566	0.02775	441	500
5		5	0.89000	0.85000	0.92000	0.00540	0.02646	445	500
10		5	0.02200	0.00000	0.06000	0.00508	0.02490	11	500
15		5	0.00400	0.00000	0.01000	0.00112	0.00548	2	500
20		5	0.00000	0.00000	0.00000	0.00000	0.00000	0	500

Graphics



Mytilus spp. Development Reference Toxicant Test Water Chemistry Data

Client: **Reference Toxicant**
Test Material: Copper Sulfate
Test ID#: 15588 Project #: PERQAQC
Test Date: 10-26-05 Randomization: NA

Organism Log#: 2493 Age: N/A
Organism Supplier: Carlsbad Aquafarms
Control/Diluent: 30ppt FSW

Day 0

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	15.9	7.76	8.1	30.2	Date: 10-26-05
1.25	15.9	7.78	8.1	30.2	Test Solution Prep: AB
2.5	15.9	7.79	8.1	30.2	New WQ: RF JKW
5	15.9	7.79	8.2	30.2	Innoculation Time: 1710
10	15.9	7.79	7.8	30.2	Innoculation Signoff: AB
15	15.9	7.79	7.8	30.2	
20	15.9	7.79	8.2	30.1	
Meter ID	#6	pH 03	Mc 08 do	Ec 01	

Day 1

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	15.2				Date: 10-27-05
1.25	15.2				Signoff: AB
2.5	15.2				
5	15.2				
10	15.2				
15	15.2				
20	15.2				
Meter ID	#6				

Day 2

Treatment	Temperature (°C)	pH	D.O. (mg/L)	Salinity (ppt)	Signoff
Control	15.2	7.80	7.4	30.2	Date: 10/28/05
1.25	15.2	7.82	7.5	30.2	Termination Time: CMB: 1550
2.5	15.2	7.84	7.7	30.3	Termination Signoff: ICH
5	15.2	7.86	8.0	30.2	Old WQ: KN
10	15.2	7.85	8.1	30.4	
15	15.2	7.87	8.1	30.3	
20	15.2	7.86	8.1	30.3	
Meter ID	6	pH09	DO08	Ec01	

Mytilus spp. Development Toxicity Test Count Data

Client: **Reference Toxicant** Test Start Date: 10/26/05
Test Material: Copper Sulfate Test End Date: 10/28/05
Test ID #: 15588 Enumeration Date: 11/6/05
Project #: PERQAQC Investigator: MM

Concentration	Replicate	Number of Normal Larvae	Number of Abnormal Larvae	Total Number Larvae	Percent Normal Development
Control	A	88	12	100	88
	B	91	9	100	91
	C	94	6	100	94
	D	93	7	100	93
	E	91	9	100	91
1.25 µg/L	A	93	7	100	93
	B	91	9	100	91
	C	91	9	100	91
	D	90	10	100	90
	E	90	10	100	90
2.5 µg/L	A	92	8	100	92
	B	87	13	100	87
	C	90	10	100	90
	D	87	13	100	87
	E	85	15	100	85
5 µg/L	A	92	8	100	92
	B	90	10	100	90
	C	88	12	100	88
	D	85	15	100	85
	E	90	10	100	90
10 µg/L	A	6	94	100	6
	B	0	100	100	0
	C	3	97	100	3
	D	0	100	100	0
	E	2	98	100	2
15 µg/L	A	0	100	100	0
	B	0	100	100	0
	C	1	99	100	1
	D	0	100	100	0
	E	1	99	100	1
20 µg/L	A	0	100	100	0
	B	0	100	100	0
	C	0	100	100	0
	D	0	100	100	0
	E	0	100	100	0

Appendix J

Bioassay Standard Test Conditions

SUMMARY OF TEST CONDITIONS AND ACCEPTABILITY CRITERIA FOR THE AMPHIPOD (*Ampelisca abdita)* 10-DAY SEDIMENT TOXICITY TEST	
1. Test type	Static non-renewal
2. Test duration	10 d
3. Temperature	20 ± 1°C
4. Salinity	20 – 35 ppt
5. Light quality	Ambient Laboratory
6. Light intensity	50 – 100 ft c.
7. Photoperiod	Continuous
8. Test chamber size	1 L
9. Seawater volume	800 mL
10. Sediment depth	40 mm
11. Renewal of seawater	None
12. Age of test organisms	Wild population, immature juveniles
13. # of organisms per test chamber	20
14. # of replicate chambers/concentration	5
15. # of organisms per sediment type	100
16. Feeding regime	None
17. Test chamber cleaning	Lab washing prior to test
18. Test solution aeration	Low bubble (~100/minute)
19. Overlying water	0.45 µm-filtered seawater (at test salinity)
20. Test materials	Test sites, reference and Lab Control
21. Dilution series	None
22. Endpoint	% Survival
23. Sample holding requirements	< 8 weeks
24. Sample volume required	4 L
25. Test acceptability criteria	≥ 85% survival in the Lab Control treatment.
26. Reference toxicant results	Within 2 SD of laboratory mean

SUMMARY OF TEST CONDITIONS AND ACCEPTABILITY CRITERIA FOR THE MARINE POLYCHAETE (*Neanthes arenaceodentata*) ACUTE TOXICITY BENTHIC TEST	
1. Test type	Static
2. Test duration	10d
3. Temperature	20 ± 1°C
4. Salinity	20 – 35 ppt
5. Light quality	Ambient Laboratory
6. Light intensity	50 – 100 ft c.
7. Photoperiod	12L/12D
8. Test chamber size	1 L glass beakers
9. Test solution volume	800 mL
10. Sediment depth	25 mm (200 mL)
11. Renewal of seawater	none
12. Age of test organisms	2-3 weeks
13. # of organisms per test chamber	10
14. # of replicate chambers/concentration	5
15. # of organisms per sediment type	50
16. Feeding regime	None
17. Test chamber cleaning	Lab washing prior to test
18. Test solution aeration	Low bubble (~100/minute)
19. Overlying water	Natural seawater
20. Test concentrations	Test sites, reference and Lab Control
21. Dilution series	None
22. Endpoint	% survival
23. Sample and sample holding requirements	< 8 weeks
24. Sample volume required	4 L
25. Test acceptability criteria	≥ 90% in the Lab Controls
26. Reference toxicant results	Within 2 SD of laboratory mean

SUMMARY OF TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA FOR THE BLUE MUSSEL (*Mytilus sp.*) ACUTE TOXICITY WATER COLUMN TEST	
1. Test type	Static non-renewal
2. Test duration	48 hours
3. Salinity	30 ± 2 ppt
4. Temperature	16 ± 1°C
5. Light quality	Ambient Laboratory
6. Light intensity	50 – 100 ft c.
7. Photoperiod	16L/8D
8. Test chamber size	30 mL vials
9. Test solution volume	10 mL
10. Renewal of seawater	None
11. Age of test organisms	Embryo ≤ 4h old
12. # of organisms per test chamber	150 – 300
13. # of replicate chambers per concentration	5
14. # of organisms per concentration	750 – 1,500
15. Feeding regime	None
16. Test chamber cleaning	Lab washing prior to test
17. Test chamber aeration	None
18. Elutriate preparation water	Site water
19. Test concentrations	Test sites, and Lab Control
20. Dilution series	Four concentrations (1, 10, 50, 100%) and a Lab Control.
21. Dilution water	Natural seawater
22. Endpoints	% survival and % normal development
22. Sampling holding requirements	< 8 weeks
23. Sample volume required	2L
24. Test acceptability criteria	≥70% survival and normal development in the Lab Controls.

Appendix K

Elutriate Suitability Determination

Table K-1. Calculation of the Elutriate Suitability Concentration (ESC)

Site:	**LRT-S02-COMP**
Species:	***Mytilus sp.***
Disposal Site:	**SF-11**

Mixing Zone Estimation	**LRT-S02-COMP**
Depth of disposal site (m)=	15
Pi=	3.14159
Width of vessel (m)=	10
Length of vessel(m)=	25
Speed of vessel (m/sec)=	0.5
Time of discharge (sec)=	30
Depth of vessel (m)=	4
Mixing Zone Volume(cu.m)=	627239

Volume of Liquid Phase	
Bulk density (constant) =	1.3
Particle density (constant) =	2.6
Density of liquid phase (constant) =	1
Vol of disposal vessel (cu.m)=	1000
Liquid phase volume (cu.m)=	813

Concentration of suspended phase	
Percent Silt=	38.5
Percent Clay=	49.6
Volume of Suspended Phase (cu.m)=	165

Projected Concentration (percent SP) =	0.0263
Lowest LC50 or EC50 from bioassay=	57.9
Factor LC50 or EC 50 X 0.01=	0.579

The factored LC50 or EC50 is higher than the projected concentration; therefore the Elutriate Suitability Concentration is not exceeded for dredged material from this site for the disposal site specified (SF-11). This assumes that sediment will be disposed of by barge at the disposal site, using a barge meeting the listed parameters.